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THE

ENTOMOLOGIST

An Illustrated Journal

OF

GENERAL ENTOMOLOGY.

EDITED BY RICHARD SOUTH, F.E.S.

WITH THE ASSISTANCE OF

H. W. BATES, F.R.S., F.L.S., F.E.S., &c.

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VOLUME THE TWENTY-FOURTH.

LONDON:
WEST, NEWMAN & CO., 54, HATTON GARDEN;
SIMPKIN, MARSHALL, HAMILTON, KENT & CO., Limited.

1891.

131751

"Granting, with the doctrine of evolution, that all the complex assemblages of existing animal forms are modified derivatives from previously existing forms, and that these are ultimately to be traced back to some common ancestor, it must of necessity follow that any given fauna will depend for the degree of its peculiarity, whether great or small, upon the amount of modification, relative to any other fauna, which it will have undergone. And this modification can be effected in two ways: by inherent modification of the individual types composing the fauna, and by intermixture with, or immigration from, contiguous or neighbouring faunas. In both cases, manifestly, isolation or its opposite, union of habitation, will constitute the governing factor in determining the amount of variation."—HEILPRIN.

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THE ENTOMOLOGIST.

Vol. XXIV.] JANUARY, 1891. [No. 332.

THE SEXES OF LEPIDOPTERA.

By W. F. de Vismes Kane, M.A., F.E.S.

I am surprised to find that Mr. Cockerell should have found it necessary to defend the views he put forward in a former paper (Entom. xxii. 177) as to the possibility of the sex being determined in the embryo by external influences, especially food. The hypothesis is now very generally accepted by biologists in relation to animals in general, and may be found stated very clearly and fully in a most interesting volume of the International Science Series, 'The Evolution of Sex,' by Profs. Geddes and Thomson. Mr. Wailly will find in Chap. IV. a reference to Lepidoptera, Mrs. Treat's experiments and Mr. Gentry's opinion being cited. A very strong case is made out in favour of the contention that differences of nutrition, in conjunction with other conditions of environment (chiefly bearing on assimilation probably) in the larval or embryonic state, determine the sexual distinctions. Evidence bearing on the subject is adduced from the life-history of the tadpole, bee, aphis, and certain arthropods. I think most practical entomologists' experience will, in a more or less degree, bear out the theory. I venture to note one or two observations of my own. I have observed in the South of France and in Italy the dwarfing of *L. icarus* and *astrarche*, resulting from the stunted condition of the food-plant produced by the climate and dry soil, and not the less striking is the preponderance of males over females in such localities.

Again, in certain species, we find a vast disproportion in number between the sexes. I would cite *Thestor ballus*. The males emerge earlier than the females and enormously exceed them in number.

May it not be due to the innutritious foliage of the *Lotus hispidus* growing in the arid localities where it is found, namely, the parched hill-sides of South Europe?

The occurrence of a dwarf form of *Euchloë cardamines*, referred to by Mr. Cockerell, is not an isolated instance; and obtains in other species of the genus, notably *E. euphenoides*, occurring in same locality and same time as the ordinary-sized imago. I think it possible that the sparse foliage of the chief food-plant, and its isolated manner of occurrence, may induce semi-starvation of the larvæ when several ova are deposited on a small plant, and this would account for the large preponderance of the male over the female specimens of these species.

A concluding suggestion is thrown out by Mr. Cockerell; that scarcity of nourishment may well tend to the elimination of females, which from their size require ample nutrition. Against this we may place the experiments of Yung on tadpoles, which showed that in normal conditions the percentage of females was only slightly in the majority. But by supplying more stimulating foods of three descriptions, the percentage was raised in Lot 1 to 78, in Lot 2 to 81, and in Lot 3 to 92 per cent. It would be well if entomologists having leisure would supplement our knowledge by further experiments in this direction.

Sloperton Lodge, Kingstown, Ireland, November 12, 1890.

NOTES ON THE LEPIDOPTERA OF THE CHILTERN HILLS.

By A. J. Spiller.

The Chiltern Hills, in Oxfordshire and Buckinghamshire, form a range of considerable elevation, their highest point being close to Chinnor, where they attain a height of some 800 ft. They are composed almost entirely of chalk, with in some places a cap of gravel, upon which two common species of heath grow. The district worked by me includes that portion of the range extending from Princes Risborough, in Bucks, to Watlington, in Oxon, a distance of some eight miles. The scenery is exceedingly grand, extensive beech-woods occupying large tracts on this area.

Every sweet, however, has its bitter, and the great drawback to collecting in this neighbourhood lies in the fact that all the woods are strictly preserved, and likewise the idea impressed in the minds of gamekeepers that persons engaged in collecting insects or plants must primarily have designs upon rabbits or "birds." My thanks are due to H. C. Brown, Esq., J.P., for permission to collect in his beautiful woods. This permission has frequently stood me in good stead, as I have on several occasions seen entomologists expelled by obtuse-headed gamekeepers.

Sallow bloom, on the only occasion I tried it in these woods, was not very prolific in rarities, only the commoner species coming to this bait. As the spring advanced I began to search the tree-trunks for recently-developed imagines, and found *Demas coryli* in fair numbers, drying their wings in the evenings throughout the month of May. *Tephrosia crepuscularia* appeared in April and May, and in the latter month *T. consonaria* was likewise very common on the tree-trunks. *Lophopteryx camelina* and *Selenia tetralunaria* (*illustraria*) were also taken in the same situations. *Drepana cultraria* (*unguicula*) was very common both by day and night. On May 15th I caught a specimen at light in a window of my house, which I had specially constructed to act as a moth-trap. As no beech occurs within a mile of my residence, this is interesting, as showing the attractive influence of light. Later on, in the autumn, *Eupithecia sobrinata* came to light in the same manner from the same distance. *Zonosoma linearia* (*trilinearia*) was not very common this season; I was much disappointed in taking so few.

Butterflies were well on the move by the middle of May, when *Thecla rubi*, as I have already recorded, appeared in great numbers, frequenting the whitethorn bloom, or fluttering in merry groups in the beech-glades. The two common May "skippers" and several of the "blues" (*Lycæna argiolus*, *L. alsus*, *L. agestis*, *L. icarus*) were met with, and, at the end of May, *Argynnis euphrosyne* in great numbers. In June *A. selene* appeared, and *Pararge egeria* (second brood) was very numerous. The wet weather in July delayed the appearance of the larger "fritillaries," but on July 10th *A. adippe* came on the scene, and was met with until the middle of August. On July 24th, which was a lovely day amongst many rainy ones, this butterfly was very numerous, showing that in a favourable season it must be an abundant species in all the beech-woods. On this latter date, likewise, I first met with *A. paphia*; it afterwards became common, and I took my last specimen on Sept. 17th. It is plentiful in a wood about half a mile from Chinnor, and, as I have noticed several times during my entomological experience of a quarter of a century, has occasionally a desire to leave its accustomed haunts for apparently aimless wanderings. At any rate, I noticed this season single specimens on two occasions flying in the streets of Chinnor.

Hesperia comma was late in making an appearance; I first saw it on August 4th. This species has a very extensive range here, but is only sparingly met with anywhere. The evening seems to be the best time for its capture, as, while the sun is slowly going below the horizon, it delights to rest itself upon the flower-heads of the scabious, apparently enjoying the warmth. On August 7th, a warm still evening, I captured 27 specimens in this manner in half an hour. *L. corydon* first appeared on August

5th; like *H. comma*, it has an extensive range, but this year must have been scarce, as a dozen to twenty specimens a day formed a very good take of this species. On my return from a holiday, on Sept. 8th, I was surprised to find *H. comma* and *L. corydon* still flying, and my last specimens of each species were taken on Sept. 16th. The ordinary common butterflies have on the whole been much scarcer than usual. I failed to see a single specimen of *Pararge megæra*, although on the look-out for it.

Amongst the moths taken upon the hills this season have been *Nemeophila plantaginis* and *Ino geryon*, already recorded; *Lithosia griseola*, *Biston hirtaria*, and *Amphidasys betularia*, resting on tree-trunks; *Thyatira batis*, *Heliaca tenebrata* (*arbuti*), *Euclidia mi*, *E. glyphica* and *Phytometra viridaria* (*ænea*), *Plusia iota* and *P. pulchrina*, *Hadena genistæ*, *Bapta temerata*, *Neuria reticulata* (*saponariæ*), *Metrocampa margaritaria* (in abundance), *Zygæna filipendulæ*, *Eremobia ochroleuca* (once), *Hepialus hectus* and *H. sylvinus*, *Spilosoma mendica*, *Cilix spinula*, and *Charæas graminis*. This latter species was frequently to be found during the day at rest on scabious flowers, and, after reading the account in Newman's 'Moths' of the time and manner of the flight of this species, I determined to put it to the proof. Accordingly, I appeared on the hills by 8 o'clock on several fine August mornings, and found the insects threading their way in all directions amongst the grass-stems. I secured a fine series, but found, at any rate in this neighbourhood, that their flight was continued to about half-past nine, when they settled for repose during the day.

At "light" at the window I secured a large number of species; on several occasions they were so plentiful as to remind me of my Natal experience in this line, where, in little over four years, I secured 994 species by this means. In the early spring I took a single specimen of *Nyssia hispidaria*, plenty of *Hybernia rupicapraria*, *H. progemmaria*, *Selenia bilunaria* (*illunaria*), *S. illustraria* (1), and numerous Tæniocampæ. Later on during the season my captures were as follows:—*Smerinthus populi*, *Hepialus sylvinus*, *Dasychira pudibunda*, *Calligenia miniata*, *Lithosia griseola*, *L. complanula* and *L. griseola* var. *stramineola*, *Arctia caia*, *Spilosoma menthastri* and *S. lubricipeda* by the score! *Bombyx neustria*, *Odonestis potatoria*, and a single specimen of *Lasiocampa quercifolia*. On my return, in September, I found that *Trichiura cratægi* came in some numbers, unfortunately all worn, but giving me hopes of finding the larvæ next season. Other captures were *Cilix spinula*, *Nola cucullatella*, *Leucania conigera*, *L. comma*. *Hydrœcia micacea*, *Axylia putris*, *Xylophasia rurea*, *X. hepatica*, *Neuronia popularis*, *Luperina testacea*, *Mamestra anceps*, *M. persicariæ*, *Grammesia trilinea*, *Caradrina morpheus*, *C. alsines*, *C. blanda*, *C. cubicularis*, *Rusina* *tenebrosa*, *Agrotis puta*, *Triphæna ianthina*, *Noctua augur*, *N. plecta*, *N. c-nigrum*, *N. triangulum*, *N. brunnea*, *N. umbrosa*, *N. baia*, *Anchocelis pistacina*, *A. litura*, *Xanthia cerago*, *Hecatera serena*, *Miselia oxyacanthæ*, *Aplecta advena*, *Hadena adusta*, *H. suasa* (1), *H. thalassina*, *Xylina lithoriza*, *Habrostola urticæ*, *H. triplasia*, *Plusia iota*, *Epione apiciaria*, *Eurymene dolobraria* (1), *Pericallia syringaria*, *Odontopera bidentata*, *Crocallis elinguaria*, *Amphidasys betularia*, *Hemerophila abruptaria*, *Cleora lichenaria*, *Geometra vernaria*, *Zonosoma omicronaria*, *Asthena luteata*, *Acidalia scutulata*, *A. osseata*, *A. incanaria*, *A. emarginata*, *A. imitaria*, *Timandra amataria*, *Strenia clathrata*, *Ligdia adustata*, *Eupithecia venosata*, *E. centaureata*, *E. satyrata*, *E. absynthiata*, *E. assimilata*, *E. coronata*, *E. rectangulata*, *Melanthia rubiginata*, *Melanippe procellata*, *Anticlea derivata*, *A. rubidata*, *Coremia propugnata*, *C. unidentaria*, *Phibalapteryx tersata*, *Triphosa dubitata*, *Cidaria miata*, *C. prunata*, *C. pyraliata*, *C. dotata*, *Anaitis plagiata*, very many more common Noctuæ and Geometræ, and numerous Micros. From long experience, I can confidently recommend "light" as an attraction for many species of moths. The conditions for the successful working of light are (1) a wide uninterrupted view, (2) a dark, damp evening, (3) a thoroughly good light, three or four lamps with reflectors being "the thing," (4) no other light near, the consequence being that in the country, where there are no gas-lamps, or, where they exist, are put out at midnight, this mode of collecting can be followed with success nearly all the year, whilst in or near large towns this plan is almost invariably a failure.

Fidonia atomaria occurs on the heathy portions of the Chilterns, and I have taken two specimens so remarkable in appearance that they seemed to be a new species. They have, however, been inspected by some half-dozen entomologists of experience, and the verdict is that they are extraordinary vars. of this species. No. 1 is a male, unicolorous, dark smoky brown, a little darker than the ground colour of *Minoa euphorbiata*. The wings and fringes are exactly alike in tint, and the only other markings are the suspicion of a central lunule on each anterior wing. No. 2 is a female, entirely smoky black.

During a visit to Thrapston, in Northants, I beat dozens of willows without taking a single larva. On my return, on Sept. 8th, I at once set to work to collect autumnal larvæ. I found beating the oaks here to be equally a failure, and the elms seemed only to produce numerous colonies of *P. bucephala*. I then turned my attention to the beech, and was surprised at the difference, for, although the species taken were few, yet their numbers made ample compensation. *Demas coryli* larvæ appeared in numbers; I often beat as many as twenty full-fed larvæ from one beech. Altogether I captured hundreds of this species, most of them having now safely spun up. *Hylophila prasinana* were also exceedingly numerous, a couple of hundred being beaten. *Lophopteryx camelina* larvæ were likewise in full force. On Sept. 16th, I entered a beech-wood on the borders of Bucks, and in half an hour had beaten 70 larvæ of this species, mostly full-fed. How many more I might have taken I cannot say, for the sound of the beating-stick brought up our entomological enemies —the gamekeepers—who requested me to withdraw. Other larvæ taken have been *Selenia illustraria*, *Odontopera bidentata*, *Drepana unguicula*, *Zonosoma linearia*, all in fair numbers. But my chief capture was a larva of *Stauropus fagi*, from a beech in Crowle Wood. I sleeved it on an apple-tree in my garden, and have now the satisfaction to find that it has changed to a pupa between united leaves.

Imagines of *Eugonia quercinaria* (*angularia*) frequently fell to the beating-stick whilst larva-collecting, and likewise a few fine *X. aurago*. Several specimens of this latter species were too nimble, and easily escaped before they could be safely boxed. I "sugared" for some time in the beech-woods in the hope of obtaining a fine series, but was greatly disappointed; in fact, sugar has been a dead failure here almost the whole of the season. At ivy-bloom the commoner autumn species were fairly represented, but I was unable to bag a single rarity.

Chinnor, Oxon, Nov. 4, 1890.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

Compiled by T. D. A. Cockerell.

(Continued from vol. xxiii. p. 369).

Hymenoptera.

Apidæ.

Panurgus ursinus, Gmel., = *banksianus*, Kby., Hampstead Heath (*Smith*).

Nomada succincta, Panz., Isleworth (*Fenn*). *N. lineola*, Panz., Hampstead (*Smith*). *N. alternata*, Kirb., Isleworth (*Fenn* and *Ckll.*). *N. lathburiana*, Kirb., Hampstead (*Smith*). *N. lateralis*, Sm., Highgate (*Smith*). *N. ruficornis* var. *signata*, Jur., Hampstead (*Smith*). *N. borealis*, Zett., Hampstead (*Smith*). *N. ochrostoma*, Kirb., Hampstead (*Smith*). *N. ferruginata*, Kirb., Hampstead (*Smith*). *N. fabriciana*, L., Hampstead (*Smith*).

Melecta luctuosa, Scop., Hampstead (*Smith*). *M. armata*, Panz., Isleworth (*Fenn*).

Cœlioxys quadridentata, L., Isleworth (*Fenn*). *C. elongata*, Lep., = *simplex*, Nyl., Isleworth (*Fenn*).

Megachile maritima, Kirb., Hampstead, once (*Smith*). *M.*

willughbiella, Kirb., Isleworth (*Fenn*). *M. circumcincta*, Lep., Bedford Park (*Ckll.*). *M. ligniseca*, Kirb., Highgate (*Smith*). *M. centuncularis*, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*).

Anthidium manicatum, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*).

Chelostoma campanularum, Kirb., Bedford Park, one on a flower of *Epilobium hirsutum* (*Ckll.*).

Heriades truncorum, L., Brentford (*Smith*).

Osmia rufa, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*). *O. cœrulescens*, L., Isleworth (*Fenn*). *O. fulviventris*, Panz., Hammersmith (*Smith*).

Anthophora retusa, L., Hampstead Heath (*Smith*). *A. pilipes*, Fab., Isleworth (*Fenn*). *A. furcata*, Panz., Brentford (*Smith*). *A. quadrimaculata*, Panz., Kentish Town (*Smith*).

Psithyrus rupestris, Fb., Isleworth (*Fenn*). *P. vestalis*, Fourc., Isleworth (*Fenn*).

Bombus cognatus, Steph., Isleworth (*Fenn*). *B. muscorum*, L., Isleworth (*Fenn*), Bedford Park (*J. W. Horsley*, fide *Fenn*). *B. latreillellus*, Kirb., Isleworth (*Fenn*). *B. hortorum*, L., Isleworth (*Fenn*). *B. hortorum* var. *harrisellus*, Kirb, Isleworth (*Fenn*). *B. hortorum* var. *c.*, black, end of abdomen grey, Isleworth (*Fenn*). *B. pratorum*, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*). *B. sylvarum*, L., Isleworth (*Fenn*). *B. derhamellus*, Kirb., Isleworth (*Fenn*). *B. lapidarius*, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*). *B. terrestris*, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*).

Apis mellifica, L., Isleworth (*Fenn*), Bedford Park (*Ckll.*). *A. ligustica*, Spin., = *A. fasciata* var., Kirch.; *A. mellifica*, var., Tasch., Isleworth (*Fenn*), Bedford Park (*J. W. Horsley*, fide *Fenn*): doubtless an introduction.

Vespidæ.

Vespa vulgaris, L., Isleworth (*Fenn*). *V. germanica*, Fb., Isleworth (*Fenn*). *V. rufa*, L., Isleworth (*Fenn*).

Polistes biguttatus, Halid., London Docks (*Smith*, Entom., 1878, p. 172): an accidental importation from Brazil.

Eumenidæ.

Odynerus lævipes, Shuck., Hampstead (*Smith*). *O. parietum*, L., Bedford Park (*Ckll.*), Bloomsbury (*Brit. Mus.*). *O. antilope*, Panz., Isleworth (*Fenn*). *O. parietinus*, L., Isleworth (*Fenn*), Bedford Park, July 5 (*Ckll.*).

Andrenidæ.

Halictus xanthopus, Kirb., Isleworth (*Fenn*). *H. leucozonius*, Schr., Isleworth (*Fenn*). *H. nitidiusculus*, Kirb., Hampstead Heath (*Smith*). *H. smeathmanellus*, Kirb., Hammersmith, olim (*Smith*).

Andrena cingulata, Fab., Hampstead (*Smith*). *A. albicans*, Kirb., Isleworth (*Fenn*), Bedford Park (*Ckll.*). *A. atriceps*, Kirb., Hampstead (*S. S. Saunders*, E. M. M., 1875, p. 20). *A. florea*, Fab., Highgate, olim (*Smith*). *A. trimmerana*, Kirb., Isleworth (*Fenn*). *A. trimmerana* var. *spinigera*, Sm., Highgate (*Smith*). *A. cineraria*, L., Hyde Park (*Smith*). *A. thoracica*, Fab., Isleworth (*Ckll.*). *A. nitida*, Fourc., Isleworth (*Fenn*). *A. fulva*, Schr., Isleworth (*Fenn*), Gunnersbury (*Ckll.*). *A. clarkella*, Kirb., Hampstead Heath (*Smith*, p. 124). *A. nigro-ænea*, Kirb., Isleworth (*Fenn*). *A. angustior*, Kirb., Highgate (*Smith*). *A. bucephala*, Steph., Hampstead Heath (*Smith*). *A. albicrus*, Kirb., Hampstead Heath (*Smith*). *A. humilis*, Imh., Hampstead Heath (*Smith*). *A. labialis*, Kirb., Hampstead and Highgate (*Smith*). *A. minutula*, Kirb., Hampstead, on *Veronica* (*Smith*). *A. nana*, Kirb., Isleworth (*Fenn*). *A. afzeliella*, Kirb., Hampstead Heath (*Smith*). *A. afzeliella* var. *fuscata*, Kirb., Hampstead Heath (*Smith*). *A. afzeliella* ab. *convexiuscula*, Kirb., Hampstead Heath (E. M. M., 1875, p. 36). *A. wilkella* var. *xanthura*, Kirb., Hampstead (*Smith*). *A. similis*, Sm., Hampstead (*Enock*, fide *E. Saunders*, E. M. M., 1888, p. 130). *A. conjuncta*, Sm., near Colney Hatch (*Smith*).

Cilissa leporina, Panz., Hampstead Heath (*Smith*).

Crabronidæ.

Crabro podagricus, V. d. Lind., Bedford Park (*D. Allport*). *C. cephalotes*, Panz., Bedford Park (*Ckll.*), Isleworth (*Fenn*).

Nyssonidæ.

Harpactus tumidus, Panz., Hampstead (*Smith*).

Nysson interruptus, Fab., Highgate and Hampstead (*Smith*). *N. trimaculatus*, Rossi, near Colney Hatch (*Smith*). *N. dimidiatus*, Jur., Highgate (*Smith*).

Gorytes campestris var. *fargeii*, Shuck., Highgate (*Smith*).

Mimesidæ.

Mimesa bicolor, Jur., Hampstead (*Smith*). *M. equestris*, Fab., Hampstead Heath (*Smith*).

Pemphredonidæ.

Passalœcus insignis, V. d. Lind., Bedford Park, July 5 (*Ckll.*).

Larridæ.

Trypoxylon figulus, L., Bedford Park, July 5 (*Ckll.*).

Tachytes pectinipes, L., Hampstead Heath (*Smith*).

Astatidæ.

Astata boops, Schr., Hampstead Heath (*Smith*).

(To be continued.)

3, Fairfax Road, Bedford Park, Chiswick, W., Dec. 16, 1890.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. Perry Coste, F.C.S.

(Continued from vol. xxiii. p. 374.)

V.—The Chemical Aspect (*continued*).

Let us then endeavour, as a first step towards understanding yellow, to analyse the results tabulated on p. 248, and group them into subclasses. Without postulating too rigid a separation, or regarding such subdivisions as other than convenient artificialities, we seem able to distinguish *three* main classes of yellow species. Firstly, those that are utterly unaffected by any reagent; secondly, there is the least exact division, consisting of those species that *are* affected, but slowly and indefinitely, yielding an unsatisfactory sickly whitish, or faded yellowish; thirdly, we have the highly interesting and satisfactory class of yellows that rapidly dissolve and leave a pure white wing; a pigment being indubitably in evidence here. This difference will be more clearly brought out if we tabulate the species in three columns thus (and I take the opportunity of adding, by way of further illustration, the names of a few among the tropical species sent me):—

UNAFFECTED.	UNSATISFACTORILY AFFECTED.	RAPIDLY DISSOLVED.
All metamorphosed reds.	Papilio machaon.	Euchloë cardamines.
Callimorpha hera lutescens.	Vanessa antiopa.	Colias edusa.
Arctia villica.	Gonopteryx rhamni.	Euremia hecabe senegaliensis.
Papilio thoas.	Lycæna alexis.	Tænias nise.
Triphæna pronuba.	Hepialus humuli.	T. vabella(?).
Heliaca tenebrata.	Rumia cratægata.	Delias hierte and eucharis, and *one metamorphosed red*, viz., D. hierte (eucharis).
Catocala palæogama.	Venilia macularia.	
Angerona prunaria.	Camptogramma bilineata.	
Xanthia silago.	Catocala cerogama.	
(The last two or perhaps three not being quite so absolutely unaffected as the others).	Abraxas grossulariata.	
	(This last species would perhaps be almost more justly placed in the third class).	

It thus appears that although I have throughout insisted on yellow being emphatically a pigment colour,* yet the species in which yellow is rapidly and satisfactorily affected (dissolved as it happens) are but a small minority of the whole. It is incumbent on me, therefore, to justify my assumption, and to endeavour an explanation of the seeming discrepancy: and it appears to me that one all-important clue may be furnished by the distinction, which I emphasised in section E, between the two kinds of pigment colour, *viz.*, the *soluble* and the *alterable.* Yellow I regard as universally a "solution" pigment, although—paradoxical as the expression may appear—it cannot in the majority of cases be dissolved. The evidence furnished by the behaviour of yellow will be found—as it seems to me—to afford additional and valuable confirmation to my views on this subject, as already explained.*

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* There is another and somewhat different view as to the nature of these various yellows that ought, perhaps, to be pointed out at any rate. In the earlier stages of my experiments it so happened that I had no specimens of *edusa* or *cardamines* to hand. For a long time, therefore, my knowledge of yellow was derived entirely from those species that are either entirely obdurate, such as *T. pronuba*, or very unsatisfactorily affected, as *G. rhamni*, &c. Add to this the fact that in every red species examined the change stopped at yellow,—which could be in no case further affected,—and it will create no surprise that I was very near concluding yellow to be always an immovable colour; a result as disappointing as unexpected. The first species that opened my eyes was *A. grossulariata:* in this case I found the yellow slowly but completely disappear. This result was so contrary to my previous experience that I carefully repeated the experiments, but with the same result. I thus had forced upon my notice the fact that some yellow *was* sensitive to reagents (a result so strikingly and abundantly confirmed when I came to examine *edusa*, *cardamines*, &c.). Now, if such species as *pronuba* and *rhamni*, on the one hand, be

But here we are confronted by an illustration of the fact, so often alluded to already, that it is impossible to go very far in an experimental investigation without adopting some provisional hypothesis. We cannot even lucidly or connectedly present the actual facts obtained without stringing them on the thread of a working hypothesis; any more than we can orderly arrange a row of beads without a thread to string them on. I will therefore preface our examination into the behaviour of individual yellow species by a statement of the theory that I have been led to form on the subject; merely warning my readers that this theory is at present extremely provisional and hypothetical, and —even so—cannot be rigidly or universally applied.

I assume, then, that the yellow pigment, when first evolved, is exceedingly sensitive and very susceptible of solution by various reagents. We have examples of this stage in several of the Pieridæ, and, still more interestingly, in *Melanargia galatea,* where we can, so to say, actually behold the pigment evolved—and dissolved.

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compared with *grossulariata* on the other, it will be noticed that whilst in the former the under side of the wing is a "faded" facsimile of the colour of the upper side, there is in the latter case no sign of yellow below. Seeing, then, that in *grossulariata* the yellow is confined to one side, and on dissolving off leaves the ground colour of pure white, it at first appeared to me that the difference might be attributable to the fact that in one instance the colour was (if I may be allowed to use a somewhat loose and figurative expression) simply "laid on" the upper side, while in the others it—so to speak—"went through" the wing. Such an explanation might, perhaps, be correlated with the statements of Hargen and Wallace ('Tropical Nature,' p. 184) as to *hypodermal* and non-hypodermal colours. Subsequent investigations having, however, given a different turn to my thoughts, I did not follow up this idea (as perhaps I ought to have done), although it suggests considerations that I shall be bound to take into account at a further stage in my work. It still appears to me not impossible that at least a *plausible* case might be made out for this hypothesis, although in the instance of *Colias edusa* one would find a troublesome objection; and since it is not quite clear how far such an hypothesis could be harmonised with, or how far it would be antagonist to, the "development" theory provisionally adopted in the text in explanation of these phenomena, it is certainly incumbent on me to put both views before my readers, that they may be enabled to form their own estimate as to the tenability or otherwise of my explanations.

* See p. 372, above.

After a time (I know not whether years or centuries or yet longer periods) the yellow pigment becomes slightly altered in constitution* (probably accompanied by a greater or less change in tint), and altered in the direction of *greater stability;* or rather, confining ourselves to what we *know*, altered to the extent of becoming far less easily attacked by solvents. Of this stage we have examples in *rhamni* and various other species, as tabulated in column 2. Concerning this secondary change, however, I make no assumption as to whether it is an inevitable sequel of the chemical changes which first led to the development of the yellow pigment, or whether it is an additional and independent development, brought about—as we may suppose—by the agency of Natural Selection; since, whatever biological ends an attractive† colour, such as yellow, may serve, we must assume that a distinct advantage would accrue to the species by such colour being rendered more stable and—*possibly* its usual accompaniment—more brilliant.‡ A question of this sort cannot be settled *a priori*, but only by distinct entomological evidence of *facts:* of facts that is as to the comparative ages of various yellow species; and in saying this I am not oblivious that such facts can only be of the nature of *inferences* from comparative entomology and the study of phylogeny. (But, as I shall show immediately, we have already one criterion—though a fallible one—of comparative age; a criterion, however, that must be used with delicacy and discrimination.) If we found that the most recently developed yellow species are uniformly possessed of a readily soluble pigment, whilst the oldest (I speak always in a phylogenetic sense, of course, and not in an autogenetic) are very difficultly affected, we should then have good reason to assume that a yellow pigment is in its very nature always destined to undergo such further modifications in course of time (or at the very least that—being susceptible of such change—it is certain to be so affected through the agency of Natural Selection). In this light one might regard the behaviour of *E. cardamines*, since the pigment here is readily soluble, and may perhaps be regarded as of (comparatively speaking) very recent development.§ But, on the other hand, there would, I apprehend, be much difficulty in the case of the *Colias* species, which I fancy to be very old established. The subject, however, is a very wide one, and it is out of the question to attempt dealing with it here; but, in quitting it, I will add that I shall be greatly obliged by any direct information bearing on this point, which appears to me both of interest and importance.

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* This change might be, for instance, in the direction of higher oxidation.

† It must not be overlooked, however, that *yellow* pigments may in many cases be protective by their resemblance to flowers. Any further evolution towards stability, *if* entailing also modification of tint, might therefore, in a given species, be fatal, and so checked by Natural Selection.

‡ But *E. cardamines* must not be forgotten, where the colour, though very soluble, is very brilliant.

§ See Darwin, 'Descent of Man,' chap. xi.

Then, thirdly, we have in such species as *A. villica*, *T. pronuba*, &c., examples of the final stage in the evolution of yellow,—the stage when the pigment has become utterly insoluble (in so far, at least, as my reagents are concerned) and very stable.

Now let me show how this explains the phenomenon of the metamorphosed red species. We may explain it from two standpoints,—the chemical or the biological; and at present I do not perceive that we have warranty for pronouncing absolutely in favour of either explanation. Let us take the biological first. We may fairly assume that the evolution of a yellow pigment in a formerly white species is—in its biological significance—a very great advance. Now, without doubt, the further evolution of red from yellow is another important advance, and (in this aspect) would depend upon the "chance" variation of some individuals to a red form, which red, being especially advantageous in some way, would be preserved by Natural Selection. Now, the longer that a species has been yellow the greater is the probability of such fortuitous red variations occurring;* conversely, the newer that the yellow of a species is, the less opportunity has there been given for a variation to red. In this light, then, we would regard the existence of a normally red species as evidence that it had passed through a long, long, period in the yellow stage. But, according to preceding arguments, this is equivalent to saying that the yellow has reached the thoroughly stable and non-sensitive condition, which readily explains why a red colour cannot be retrogressively modified further back than yellow. From the simply chemical standpoint we should ignore the action of Natural Selection as prime agent, and merely say that the metabolic processes that originally led to the formation of yellow pigment, and then to its further modification into a stable yellow, tended to culminate in a red. This interpretation equally supposes a stable yellow as the precursor of the red; so that from whichever standpoint we regard the subject, we must consider the existence of red as a guarantee of the stability of its predecessing yellow; in either case we have an explanation of the puzzle.

But that the biological explanation (which, of course, equally supposes the susceptibility of yellow to a red-producing change) is safer than the purely chemical seems to me probable, not only from various general considerations (including this, that it is unwise to assume what looks like an "inherent tendency" to progress—at least without strong cause), but also from the fact that the biological explanation can be better harmonised with the exceptional behaviour of *Delias hierte* and *eucharis;* for in these species the modification has been so rapid that the yellow has become partly transformed into red, while yet in the *primary unstable stage*.* It would be difficult to exaggerate the interest and importance which these two species possess for me, since their behaviour both furnished the last and important link in the chain of evidence as to the genetic relations of red, yellow, and white; and also showed that the difference between soluble and insoluble yellows was one of degree only, and not of *kind*.

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* In the concluding part of these articles I shall have occasion to quote a number of instances illustrating this and allied points.

But after emphasising so strongly the interest attaching to these species, I must not quit the subject without a word of description of them and their behaviour. They are white species of Pieridæ; on the under side of the hind wings is a broad patch of yellow, and adjoining this a *red* blotch. So that here we have co-existing the three stages in coloric evolution. Great was the interest with which I experimented. On adding the usual reagents the red was instantly changed to yellow,—that of course; but the question was, what would happen next? I had no need to wait long for an answer; in a very short time the *whole of the yellow was dissolved, leaving a pure white wing*. So at last I had succeeded in finding an instance in which red was changed to yellow, and then that yellow dissolved.

This instance of *Delias* shows, therefore, that although red is usually preceded by a stable yellow, this is not indispensable; red may be evolved direct from an unstable yellow. It would be exceedingly interesting to follow up this subject into its biological bearings did not the urgent limits of space forbid; I must, therefore, defer further speculations on this matter to a possible future period. Three points still remain to be indicated; firstly, that, throughout, the flexible biological explanation, demanding nothing more than the known fact of a yellow *capable* of progressive change, and the action of Natural Selection, which may develop one yellow into a brilliant red and retain another and precisely similar yellow in its initial condition, harmonises far better with the complicated facts than does a rigid and more purely chemical† explanation involving "necessary" developments and "inherent tendencies": secondly, that regarding the distinction between "soluble" and non-soluble but "alterable" pigments as marking a real difference in constitution, we can understand how, if yellow belong (as it does) to the soluble class, it should be incapable of *alteration* by reagents even when by a slight modification in constitution it has become insoluble; this lessens the difficulty seemingly presented by the unaffected yellow species: thirdly, we have here, in the existence of one or more red species in any genus, the criterion above referred to of the phlygenetic age of all the yellow species of that genus; but the criterion, as already stated, is both fallible and to be applied with discrimination.

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* These are the exceptional instances to which I alluded in the footnote on p. 310.

† This may seem somewhat a misnomer, but I wish to distinguish between the explanation that involves a reference to the totality of the conditions of life, and that which involves the chemical processes of life and nothing more.

We have now to apply this hypothesis (somewhat digressively explained) to the facts presented in our tables.

First of all we will examine instances from the red point of view, and then others from the yellow.

I pass by the species *P. apollo*, *S. ocellatus*, and *Z. filipendulæ*—since I know nothing as to any yellow relatives of these species—with the remark that if any yellow *Parnassius*, *Smerinthus*, or *Zygæna* exist, the yellow would probably be unaltered by any reagents. But in the Arctiidæ and in the genus *Catocala* we have two remarkably interesting sets of phenomena presented, to the which I invite the reader's careful attention.

First, as to Arctiidæ: having found, by so far invariable experience, that a yellow produced by acting on red could be moved no farther, and not having, at that time, excogitated in full detail, any conclusions as to the progressive stability of yellow, as set forth in preceding paragraphs, I was considerably at a loss to bridge over the gulf between the metamorphosed-red yellow and the readily soluble yellow. Now the red of *Arctia caia* and *Callimorpha hera* could—like all other reds—be modified no further back than to yellow; but it occurred to me that if one took a *yellow* variety of either of these to start with, *that* yellow might possibly be accessible. I therefore experimented, and with considerable interest, on *C. hera lutescens* but, as the table shows, in vain; *lutescens* was utterly unaffected. Then it occurred to me that, by starting still further back, I might yet be successful. I therefore experimented on *Arctia villica*,—that is, on a normally yellow species,—hoping that the yellow here might be less obdurate than in a yellow variety of a red species. But here again my efforts were useless, for *villica* was practically unaffected. I was therefore forced to abandon my hopes of getting the connected stages from red to pure white within this group of the Arctiidæ; and from the point of view which I have now attained this is quite as it should be.

Next, we will take the case of the *Catocalæ*. The crimson of *C. nupta* is changed to the usual yellow, and of course no farther. Now, among the specimens kindly sent me by Mr. Jones, from America, were two yellow species of *Catocala*,—viz., *C. palæogama* with orange hind wings, and *C. cerogama* with yellow. Thinking it very interesting to have the opportunity of examining, in a second group, the reaction of yellow species related to a known red species, I experimented on *C. palæogama*. The result was just what I expected in accordance with the theory already explained, and by that time familiar to me. The orange of *C. palæogama* was quite *un*affected. And here the matter might well have rested; but somehow—I don't exactly know why—it occurred to me to experiment on the second species—*C. cerogama*. The result was very unexpected, and served as another warning to me of the danger in assuming too great a generality or rigidity in the behaviour of these colours. The yellow of *C. cerogama* was by several reagents considerably affected: in no case, it is true, was the pure white of dissolution-phenomena produced, but the result was a very faded yellow; in accord with this fact this species is placed in the second column on page 9. Here, then, in this genus we have the very interesting fact that all stages in the evolution up to red are displayed by actually living species. First of all there are, it seems, species of *Catocala* in N. America without any coloured markings at all;* next we have the type of *C. cerogama* displaying a yellow intermediate in character between the soluble yellows and the thoroughly stable ones: then we have the type of *palæogama*, in which the colour has *deepened to orange*—which is wholly unaffected by any reagents: and lastly, we have the *nupta* type, in which the colour has advanced to red with its usual characteristics. It seems to me extremely probable that other species, if examined, might be found to display intermediate stages of behaviour between these.†

The remaining species recorded in this table I may pass lightly over; merely pointing out that in *H. humuli*, which has evolved slight pink markings, the yellow of the ground colour is not dissolved, but simply modified into a "sickly yellowish" (column 2 on p. 9); whilst in *Xanthia silago*, which has somewhat more pronounced reddish markings, the yellow is wholly unaffected. It should also be noted that the pale pink of *Deilephila lineata* does not become yellow so much as "yellowy whitish," a phenomenon pointing perhaps to a partial solution of the pigment: but I am not prepared to discuss this point until I shall have had an opportunity of examining a larger number of pink species (as distinguished from red).‡

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

Notes from my Diary.—June 20th.—Went to the Vale of Llangollen, the object being *Sesia scoliæformis*. Stayed at the Chain Bridge Hotel, beyond Llangollen and half-way up the Vale. Sugared in the early evening, then worked with the net down the left side of the Vale. Took *Melanippe montanata* and *Camptogramma bilineata.* Nearly trod upon a larva of *Odonestis potatoria*, which was requisitioned. Examined the treacle,—result, nothing! June 21st.—Went to the Abbey de Valle Crucis. The curator remembered Ashworth, but had not seen entomologists in the neighbourhood for years. Went to the *S. scoliæformis* wood, on the lower slopes of the Bron Vawr (Big Breast). Had a difficulty with the tenant, which terminated amicably. The slope of the wood (chiefly birch) is at an angle of something like 45°; there is much loose slate from the top of the mountain. Travelling most difficult. There is a legend in connection with this wood, as follows:—"Once upon a time, a well-known entomologist took away *all* the decayed birch trunks, and therefore *all* the *Sesia scoliæformis.*" (This brief narrative possibly suggested the story of "The Man in the Moon.") Sticking out of the old birch stumps were pupa-cases (empty) of the *Sesia* family. Living pupæ of *S. culiciformis* had been taken in the neighbourhood about a fortnight before, and the imagines successfully bred. I was too late! I found two sizes, or species, of empty cases,—a small one and a large one; but they might be male and female. Took *M. sociata* var. *subtristata* and *Eubolia plumbaria* in the wood. As no *Sesia* were to be had, we climbed up the Vawr to its crest, the Eglwyseg Rocks, said to be one of the haunts of *Agrotis ashworthii.* Easier getting up than down; in fact the latter was dangerous. One of the party suggested a military "right close" to where the descent was clothed for a couple of hundred feet or more with close, short grass. We then sat down at distances from each other, and using our hands and feet to regulate the speed, &c., came down tobogganin fashion. It was delightful; but, like other delights, brief, for the *débris* was soon reached. In the evening, crossed the railway, and netted along the edge of a birch, oak, &c., wood. Took *Drepana falcataria* (*falcula*), *Cabera pusaria, Melanippe montanata, Rumia luteolata* (*cratægata*), and exceptionally large and brilliantly green *Larentia viridaria* (*pectinitaria*). Sugar again useless. June 22nd.—Walked through the fir and oak woods on the Holyhead road to Glyndyfrdwy. Saw our only representative of the "whites." Took *Arctia menthastri* at rest by the wayside; also thirty or forty leaden-coloured Micro-looking larvæ from spun-together heads of St. John's wort. These larvæ all died after reaching Chester. Stretched out along the stem of a garden-rocket (one of the sweetest of flowers) was a caterpillar of, probably, one of the *Tæniocampa* tribe. It pupated, June 28th. Lunched at the Berwyn Hotel, Glyndyfrdwy. The hotel is perched high up on the right bank of the Dee. From the lawn in front is a magnificent view over a long, placid, and beautifully wooded stretch of the river. These pools are still navigated, for fishing purposes, by the basket-like *coracle.* Walked back to our hotel again by the road (total, eight miles). Took young larvæ of *Vanessa urticæ* from wayside nettles. Also a *D. falcataria* at rest. Wind, up to date, a gentle breeze from the N.W. Threatened for rain; then showers. In the afternoon, came across, near Llangollen, an *Acidalia;* hoped it might be the rare *A. contiguaria;* turned out to be only a form of *A. aversata.* Also *Asthena candidata, Panagra petraria, Acronycta psi.* The last mentioned were exceedingly light in coloration. Sent on traps by last train to Llangollen. Evening wet. The rain was of the species "small"; more like mountain mist. Went to birch and oak wood of the previous evening. Took *Iodis lactearia, C. bilineata, L. viridaria,*

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* See Kirby's 'European Butterflies and Moths,' p. 269. I may add, also, that in *C. palæogama* the under-side of the fore wings is marked with yellow, ; so that here we seem to have signs of a still further advance,—though of what use yellow in such a position may be I cannot imagine. Perhaps it is simply a case of correlation. Cf. *Callimorpha hera*.

† I am grievously disappointed that there seems no chance of even re-acting the *blue* of *fraxini* genetically with the red and yellow of other species: but the case is, I fear, hopeless. See future discussion under *Blue*.

‡ Similar results have lately been obtained with other pink species; these would almost seem to form a separate subclass.

Xylophasia rurea and var. *combustata*. The two last were plentiful and flying promiscuously. June 23rd.—Up at 5 a.m. to catch the first train from Llangollen. On the landing at the top of the stairs I took a farewell look at a big trout, whose haunt was in the clear depths below; then up at a flock of swifts, which raced and screamed continually to and fro past the window. What a natural rockery: such ferns, and red valerian (the last did not attract a single moth); such trailing, drooping woodbine! Turning away I spied a Noctua at rest on the glass. It was a fine specimen of *Plusia pulchrina*. Breakfast. A delightful walk down the Vale to Llangollen amid the changing lights on the mountain tops. These, bathed in heavy dews, were silvered at intervals by the rising sun. June 23rd to July 16th.—From 36 larvæ of *Agrotis ashworthii*, 34 imagines appeared between these dates; 32 out of the 34 were perfect. August 7th.—The Vale of Llangollen again. Ran along by rail with a London friend to Glyndyfrdwy. Worked down the Vale on the left bank of the river to the Chain Bridge Hotel. Well-wooded with high fern-clad grounds, suggesting fritillaries. Hazels abundant; hanging with clusters of nuts. A dull day; saw nothing worth recording. The locality, however, should be well worth working under favourable circumstances. August 8th.—Friend and I went near "The Loggerheads," between Ruthin and Mold. This is scenery that cannot be beaten in North Wales. A hot, sunny day. *Satyrus semele*, *Cœnonympha pamphilus*, *Polyommatus phlæas*, *Lycæna astrarche*, *L. agestis*, *L. icarus*, unusually abundant. Saw occasionally *Vanessa cardui* and *Epinephele ianira*. Came across hundreds of full-fed *V. io* larvæ on nettles. Said to be a neighbourhood for *A. contiguaria;* another local moth hidden away from extinction.—J. Arkle; 2, George Street, Chester, September 22, 1890.

Abundance of certain Autumn Larvæ.—One of the most remarkable features of the entomological record of 1890 was the extraordinary abundance of autumn larvæ. In a garden in Norwich, where I was staying during the month of September, everything was infested with larvæ, even to the ferns, which were in many cases almost entirely stripped of their green parts. The many-coloured larvæ of *Orgyia antiqua* (the common vapourer) were by far the most abundant, proving a perfect nuisance by their curious habit of constantly flinging themselves to the ground, from a Wisteria arbour which spans the path. What could induce these insects to act in this manner I was unable to ascertain, as there was nothing but an iron garden-seat and the pebbles of the path to tempt them. This falling was not produced by wind or birds, or any other obvious cause, for, during perfect stillness of all their surroundings, they would fall by dozens upon the unfortunate occupants of the garden-chair. Nor is this a habit confined to any particular age or period of the larva's existence, for among those that fell were small, large, and intermediate-sized individuals. Moreover, this habit caused a great mortality among them, for they were no sooner fairly down than they began to make for a white-washed wall which forms one boundary of the path, and attempt to climb up again to the arbour from which they fell. Now it so happened that many small garden spiders had elected to weave their webs from this wall to the iron framework of the arbour, and as the larvæ came to this part of their journey they often became entangled in the webs, were captured, and preyed upon by the small spiders. Is it a usual thing for garden spiders to attack, conquer, and suck the juices of larvæ many times bigger than themselves? I was the more struck by this procedure on their part as the *antiqua* larva is supposed to be a distasteful morsel to birds and other predatory creatures, owing to the barbed hairs with which it is so abundantly furnished. I also, on one occasion, observed a quarter-grown *antiqua* larva hanging from the same arbour by a long silken thread, up which it was laboriously climbing at the rate of about two feet per hour; this it did by rolling the silk into a ball with its abdominal feet. I never before saw a larva of this species hanging by a silken thread, though I should not be astonished if they had the power to produce them, seeing that they weave a silken pupa-case. The other larvæ which were conspicuous by their numbers were those of various Noctuæ, and of *Spilosoma menthastri*, of which there are always a few in the garden. Larvæ of Rhopalocera were much less abundant than usual. Although I worked diligently, I have been able to procure scarcely any imagines except those of Tortrices, which were fairly abundant.—E. W. Carlier; 36, London Street, Edinburgh, Oct. 18, 1890.

Larvæ of Ephestia sp.? feeding on Cork-packing in Grape-casks.—Some six or more years ago I found in some Almeria grape-casks a number of larvæ feeding on the cork-dust used in packing. They were placed aside, and forgotten. Some months later, looking into the box in which the larvæ had been placed, some dead moths were found; so far as I am able to remember, they were of a darker grey than *Ephestia cahiritella* (*passulella*), and with more distinct transverse lines. Until a few days ago I had not again met with the larvæ; and now I have about a dozen before me, from which I have drawn the following description:—Larva: Three-quarters of an inch in length, pink or whitish pink (the mature larva more pink than that of *E. cahiritella*), with a few whitish hairs; head horn colour; mandibles darker; frontal plate paler, the basal half darker in some examples. Living in cocoons of cork-dust, loose, or attached to the sides of the cask. The larva of *E. cahiritella* forms silk-lined passages through dried currants, and may be found in almost any case of them; there appears to be a constant succession of broods throughout the year. They are flying at the present time in our stores, but are most numerous in the summer months. In the cases with the larvæ may sometimes be found the cocoons of a small black ichneumon. I may add that I obtained a very pretty ichneumon from the first lot of the larva now described.—W. T. Pearce; 101, Mayfield Road, Seafield, Gosport, November 24, 1890.

Phalera bucephala larvæ feeding on common Laurel.—Several records have been made during the past year of larvæ feeding on the common laurel (*Cerasus laurocerasus*). I can add to the list *Phalera bucephala*. A colony of these larvæ, about three-fourths grown, I observed feeding on the above-named plant in July last, at Bickleigh, South Devon. The shrubs were forming a fence to the station-master's garden, which is situated close to the railway station.—G. C. Bignell; Stonehouse, Plymouth.

The Cheshire Plague of Caterpillars. — It would appear from Mr. Arkle's remarks (Entom. xxiii. 293) that Cheshire, during the present year, has been almost free from the attacks of "caterpillars," for he states (*l. c.*) "not merely from personal observation, but from exhaustive enquiry, that no extraordinary appearance of caterpillars has occurred in Cheshire this year." I am sorry Mr. Arkle should have committed so grave an error in making such statements, and that his "exhaustive enquiry" should have been confined to such a small portion, or portions, of Cheshire,—which must have been the case, or he would have arrived at a very different conclusion. For the last four years I have devoted much time to the study of Economic Entomology, and during that period I do not remember having seen certain injurious larvæ so abundant as they have been this year in certain portions of Cheshire.

Nematus ribesii, Curtis, was so abundant in one district, by the end of June, as to have completely defoliated the gooseberry bushes, thereby rendering the fruit useless and destroying the would-be "bearing buds" for the coming season. I am glad to state that this only happened in cases of gross neglect on the part of the owners who took no measures to destroy the larvæ in any shape or form. All the bushes in this particular district were equally attacked; but those who took the precaution to have their bushes beaten about once a week, and the larvæ killed, had excellent crops and plenty of wood left for the future. This was not at all an exceptional case, but I quote it as my own personal observation. Has this Hymenopteron any insect parasites? I have never yet bred any from the larvæ, although I have kept quantities of them. The larva seems to be very nauseous, as the only bird that I have found to feed upon it is the cuckoo (*Cuculus canorus*). In the year 1879, at Upwell, Cambs., I shot two male specimens of this bird, the stomachs of which were quite distended with the larvæ of *N. ribesii*; and last year (1889), on dissecting another specimen of this bird, I found in it many larvæ of *Abraxas grossulariata*. This proves that it is one of the most useful of our insectivorous birds, and, so far, the only Britishbird known to feed upon nauseous larvæ.

Cheimatobia brumata.—I never remember having seen the larvæ of this insect so abundant here as it was this spring. Almost all kinds of fruit trees suffered more or less from its ravages, especially the apple; many crops of the latter were seriously injured, and in one locality—about two miles from here—the crop was a complete failure, entirely through the ravages of these "looper grubs." In another district the ravages committed by them on a plantation of nut trees were so extensive as to ruin the whole crop. During the last week in October, 1889, the males simply swarmed at the gas-lamps; just outside our city I counted as many as thirty-five individuals on a single lamp. Probably this accounts for the unusual abundance of the larvæ this year. Up to the time of my writing this (Nov. 20th) I have only seen about half-a-dozen males at the "lamps," which is strange, as the weather seems favourable for their development, Are the apterous females attracted by light? I once, in October, 1888. took a female at a gas-lamp, which might have been attracted by the light, or it is just possible that she might have mistaken the lamp-post for a tree trunk. In this county very little seems to be known of this pest of the orchard, consequently nothing is done to keep it in check. "Stick banding" seems to be quite unknown, which is much to be regretted.

Hyponomeuta padellus, Linn.—This web-making pest has favourite localities in this county, which it infests more or less every year. This year it occurred in all its force, especially near Chester, where many bucketsful of the larvæ and their webs were collected and burned.

By the foregoing remarks I do not wish to convey to the reader the idea that we had a "plague of caterpillars," in the true sense of the word. I only wish to show that some species were unusually abundant here.

I may just mention that the Aphidæ infesting the apple, plum, currant, and rose were never known to be so abundant as they were this year. From what I saw myself I think that the two latter suffered most.—R. NEWSTEAD; Grosvenor Museum, Chester, Nov. 20, 1890.

EMYDIA CRIBRUM.—I think Mr. Fowler rather under-estimates the percentage of males of *E. cribrum* netted by collectors, when he puts it at 60 per cent.; 97 per cent. would be nearer the mark. It may be of interest to note that this insect may be freely taken by "assembling," as we found by the sport which followed the capture of a freshly-emerged female, on the night of the 18th June. Mr. Corbin also tells me that in one night, many years ago, he took over sixty males by this means.—V. GERRARD; 47, Foulden Road, Stoke Newington, N.

CHŒROCAMPA CELERIO FOUND IN A MOUSE-TRAP.—Mr. Esson, of Aberdeen, has sent me a very fine specimen of *C. celerio*, which is supposed to have flown into a shop in Aberdeen, and was found by a boy in a mouse-trap, which had been set with a piece of meat. I may add that, altogether, I have had over twenty specimens of *C. celerio* pass through my hands from time to time. Four of these came from Carlisle; three from Manchester; three from Bolton; two from Doncaster; and one example from each of the following places—Kendal; Preston; Littlehampton; Whalley; Grange; Stockton; Brighton; Aberdeen. In addition to these is one from the collection of the late Mr. B. Standish, without locality.—J. B. HODGKINSON; Ashton-on-Ribble.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*December 3rd*, 1890.—The Rt. Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. Mr. Samuel James Capper, F.L.S., of Huyton Park, near Liverpool; and Mr. John Gardner, of 6, Friar Terrace, Hartlepool, were elected Fellows of the Society. Dr. D. Sharp exhibited specimens of *Papilio polites*, *P. erithonius*, and *Euplœa asela*, received from Mr. J. J. Lister, who had caught them on board ship when near Colombo, in November, 1888. Dr. Sharp read a letter from Mr. Lister, in which it was stated that from the ship hundreds of these butterflies were seen flying out to sea against a slight breeze. Many of them, apparently exhausted by a long flight, alighted on the deck of the ship, and large numbers perished in the sea. Lord Walsingham exhibited a coloured drawing of a variety of *Acherontia atropos*, which had been sent to him by Mons. Henri de la Cuisine, of Dijon. He also exhibited specimens of an entomogenous fungus, apparently belonging to the genus *Torrubia*, growing on pupæ, received from Sir Charles Forbes, which had been collected in Mexico by Mr. H. B. James. Mr. M'Lachlan expressed an opinion, in which Mr. C. O. Waterhouse and Mr. G. C. Champion concurred, that the pupæ were those of a species of *Cicada*. Mr. F. D. Godman said that at the meeting of the Society on the 3rd October, 1888, he had exhibited a larva of a *Cicada* with a similar fungoid growth. The specimen was subsequently produced, and the fungus proved to be identical with that on the pupæ shown by Lord Walsingham. Mr. R. Adkin exhibited male specimens of *Spilosoma mendica*, Clk., bred from ova obtained from a female of the Irish form which had been impregnated by a male of the English form. These specimens were of a dusky white colour, and were intermediate between the English and Irish forms. Mr. F. Merrifield showed samples of a material known as "cork-carpet," and explained its advantages as a lining for cabinets and store-boxes. Dr. Sharp fully endorsed the opinion expressed by Mr. Merrifield. Mr. R. W. Lloyd exhibited specimens of *Anisotoma triepkei*, Schmidt, and *Megacronus inclinans*, Er., collected last August at Loch Alvie by Aviemore. Mr. Merrifield read a paper entitled, "On the conspicuous changes in the markings and colouring of Lepidoptera caused by subjecting the pupæ to different temperature conditions." In this paper it was stated that the results of many experiments made on *Selenia illustraria* and *Ennomos autumnaria* tended to prove that both the markings and colouring of the moths were materially affected by the temperature to which the pupæ were exposed: the markings by long continued exposure before the last active changes; the colouring, chiefly by exposure during these last changes, but before the colouring of the perfect insect began to be visible, a moderately low temperature during this period causing darkness, a high one producing the opposite effect, and two or three days at the right time appearing in some cases sufficient. Dryness or moisture applied during the whole pupal period had little or no effect on either markings or colouring. Applying the facts thus ascertained, Mr. Merrifield said he had obtained from summer pupæ of *illustraria* some moths with summer colouring and spring markings, some with spring markings and spring colouring, and some with summer markings, but an approach to spring colouring. These specimens, with enlarged and coloured photographs of them, were exhibited. Mr. C. Fenn, who said he did not agree with Mr. Merrifield's conclusions, exhibited a very long and varied series of specimens of *Ennomos illustraria*, all of which, he stated, had been bred at the same temperature. He expressed an opinion that the presence or absence of moisture, rather than differences of temperature, was one of the principal causes of variation. The discussion was continued by Lord Walsingham, Colonel Swinhoe, Mr. Waterhouse, Mr. Jenner Weir, Captain Elwes, Mr. M'Lachlan, Mr. Porritt, Dr. Mason, Mr. Barrett, and others. Mr. G. T. Baker read a paper entitled, "Notes on the Lepidoptera collected in Madeira by the late T. Vernon Wollaston." The paper was illustrated by a number of figures drawn and coloured some years ago by Prof. Westwood. Mr. Hamilton H. Druce exhibited several very beautiful species of butterflies, belonging to the genus *Hypochrysops*, from the Solomon Islands and Australia, and read a paper on the subject entitled "A Monograph of the Lycænoid genus *Hypochrysops*, with descriptions of new species." Mr. C. J. Gahan read "Notes on some species of *Diabrotica*."—H. Goss and W. W. Fowler, *Hon. Secretaries*.

The South London Entomological and Natural History Society.—*November 27th*, 1890.—W. H. Tugwell, Vice-President, in the chair. Mr. R. South exhibited examples of *Melanippe fluctuata*, L., from various localities, and called attention to the var. *costovata* of Haworth, also to an unusually large specimen from Scotland; he also referred to Millière's figure of the variety known as *neapolisata*, and expressed a doubt as to the occurrence of this form in Britain. Mr. Hodges, *Leucania vitellina*, Hb., taken Sept. 26th, 1890; also specimens of *Caradrina ambigua*, Fb., Isle of Wight, Aug. 1888, and one from Guernsey, Sept. 1890. Mr. R. Adkin, a series of *Spilosoma menthastri*, Esp., bred from ova received from the North of Ireland, the whole of the moths having a distinct brownish tinge of colour, which was common to both sexes, the specimens also varied much in the arrangement of the spots; he remarked that he understood this form was the prevalent one in the district. Mr. Tugwell said that Mr. Adkin's specimens were very similar to those from the neighbourhood of Perth. Mr. Short, series of the two forms of *Lobophora viretata*, Hb., bred from ova received from the Birmingham district, and stated that he occasionally took the species in the North of London. Some discussion took place as to the difference in colour and size of the respective broods. Mr. Short also exhibited three examples of *Spilosoma fuliginosa*, L., from Aberdeen, much larger and paler than those usually received from the north. Mr. Adye, forms of *Anchocelis lunosa*, Haw., from Christchurch, Hants. Mr. Tugwell, insects from New Caledonia; also long series of *Triphæna comes*, Hb., from English and Scotch localities, and extreme forms from Shetland; the series showed considerable variation; and *T. orbona*, Hufn. (*subsequa*, Hb.), which species, the exhibitor remarked, was more stable in colour, and the variation was less decided than in *T. comes*. Mr. Billups, foreign Coleoptera; also numerous species of Diptera, taken by himself during the past season, among which were *Tetanocera ferruginea*, Fen., *T. elata*, Fen., *T. punctulata*, Scop., *Acidia cognata*, W., *A. heraclei*, L., *Palloptera arcuata*, Fen., *Limnia marginata*, F., *Platystoma seminationis*, Fen., &c.

December 11th.—W. H. Tugwell in the chair. Mr. R. Adkin exhibited *Peronia hastiana*, L., bred from larvæ received from the Isle of Man; *Hepialus sylvanus*, L., taken in Kent; and called attention to a peculiar habit of the latter species of hanging from the herbage when *in copulâ*. Mr. R. South, *Lycæna astrarche*, Bgstr., vars. *allous*, Hb., *salmacis*, St., and *artaxerxes*, Fab.; and made some observations thereon. Mr. Tugwell, long series of *Eupithecia satyrata*, Hb., English and Scotch; also the var. *callunaria;* also several specimens of a *Eupithecia* from Paisley, which Mr. Tugwell said he could not think were referable to *E. satyrata*. Mr. C. G. Barrett expressed an opinion that they were *E. trisignaria*. Mr. Fenn said he had never heard of this species so far north as Scotland. There was considerable discussion relative to this exhibit. Mr. Short, *Epunda lichenea*, Hb., from Portland. Mr. Farrant, a small form of *Hypsipetes sordidata*, Fb., and a Deltoid which he stated was taken in Somerset. Mr. Tugwell expressed an opinion that this species was new to the British list. Mr. South remarked that he had seen the species from Japan; and Mr. Fenn said he had seen something very like it from Jamaica. Mr. T. R. Billups, *Masicera sylvatica*. Fn., bred by Mr. Fenn from the larva of *Saturnia pavonia*, Schiff. Mr. Winkley had also bred the same species from *Pieris brassicæ*, L.; *Phorocera concinata*, Mg., by Mr. Frohawk from *Vanessa urticæ*, L; *Trixia variegator*. Mg., from *Cheimatobia boreata*, Hb., by Mr. South. Mr. Billups also called attention to three specimens of the rare *Oxycera terminata*, Mg., one of which he had bred from a pupa found in his own garden, Dulwich, August, 1889, the other two being captured in the same locality in August last; he also exhibited several species of Hymenoptera' parasitic on the ova of Lepidoptera and Diptera.—H. W. BARKER, *Hon. Sec.*

Birmingham Entomological Society.—*November* 17*th*, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. M. Stanger Higgs was elected a member of the Society. Mr. H. M. Lee showed *Calocampa vetusta*, *Scopelosoma satellitia*, &c., from Sutton Park. Mr. P. W. Abbott showed a fine series of *Tapinostola fulva*, taken in Sutton Park, flying at night, in the company of *Nonagria arundinis*. Mr. R. C. Bradley showed two varieties of *Abraxas grossulariata*. A discussion followed on the causes of colours in insects, in which Messrs. W. G. Blatch, C. F. Thornewill, R. C. Bradley, and C. J. Wainwright joined. Mr. C. J. Wainwright showed several wings of *Selenia tetralunaria* denuded of scales, one of which lacked half of one longitudinal vein. A discussion followed, in which Messrs. Blatch, Thornewill, and Wainwright joined. Mr. Blatch mentioned a curious case of a specimen of *Habrostola urticæ*, which had the body filled with scales like those on the wings. Rev. C. F. Thornewill showed a collection of Lepidoptera, made at Abbott's Wood in June, 1890, and made remarks on them.

December 1*st*, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. Blatch reported that, during 1890, he had taken sixty species of beetles new to the Midlands. Messrs. C. F. Thornewill, R. C. Bradley, W. Harrison, G. W. Wynn, and A. Johnson showed collections of insects taken during 1890. Mr. Thornewill's included a specimen of *Scotosia certata*, taken on 8th September, and seeming, therefore, to point to a second brood of the species. Mr. G. T. Baker showed a collection of butterflies, taken in the Madeira Islands. Mr. C. J. Wainwright showed *Cosmia affinis* and *diffinis*, taken from near Bromsgrove.—C. J. Wainwright, *Hon. Sec.*

Lancashire and Cheshire Entomological Society. — *Monday, November* 10*th*.—The President, Mr. S. J. Capper, in the chair. Mr. E. C. Stott was elected a member. Referring to Miss Ormerod's new 'Manual of Injurious Insects,' a copy of which the authoress had presented to the Society, the President said that the volume had been greatly enlarged since the last edition. It contained a large number of new figures, and remarks on twenty new insects, which had been found to be injurious to crops since the last edition was published. There was also a portrait of Miss Ormerod; and he recommended all interested in economic entomology to procure a copy. Mr. J. Cosmo Melvill read a paper on "*Hypocephalus armatus* (Desm.), the rarest and most extraordinary member of the Coleoptera," giving an account of its structure and probable affinities, and exhibited one of the nine specimens known to exist in collections; also various members of other families, with which *H. armatus* had been compared. During the conversazione, the President exhibited some fine varieties of *Abraxas grossulariata*; Mr. Newstead, *Acherontia atropos*, large nests of wasps, and the only three specimens known of a Coccid, *Orthezia occidentalis*, sent him for figuring by Mr. J. W. Douglas; Mr. Gardner showed Goedart's 'Metamorphosis et Historia Naturalis Insectorum,' a.d. 1662; Rev. H. H. Higgins exhibited *Apatura pavoni*; and Mr. C. S. Gregson, 100 varieties of *Abraxas grossulariata*, picked out of 4000 specimens bred by him in 1890.

Monday, December 8*th*.—The President in the chair. Mr. B. H. Crabtree was elected a member. Mr. R. Newstead read a paper on "British Wasps, their parasites and scavengers," in which he gave the life-history of the wasp, from the commencement of the nest by the single queen to the complete formation of the colony, and enumerated twenty-two species of insects, which he had found inhabiting these nests. The paper was fully illustrated with specimens and diagrams. The President exhibited *Acidalia immorata*, from Lewes. Mr. Gregson, cases of *Articulatæ*, showing manipulation before being presentable at public and private museums. Mr. Sydney Webb, his two specimens of *Plusia moneta*. Mr. Beschorner, foreign *Papilios*. Mr. Stott, a very variable series of *Charæas graminis*. Mr. P. Schill, *Parnassius apollo* and *P. phœbus*, from Switzerland; also specimens of *Papilio machaon*, showing the marked difference between English and Swiss examples of this species.—F. N. Pierce, *Hon. Sec.*

OBITUARY.

Mr. Frazer S. Crawford, of Adelaide, South Australia, died October 30th, 1890, in the 61st year of his age. He was an expert photographer, and held the position of photo-lithographer to the Survey Department; but he also discharged the duties of another office in the Government service, *viz.*, that of Inspector of Vine and Fruit Pests. "His demise is a very great loss to the whole of the Australian Colonies, and to the branches of scientific investigation in which he has rendered such great service during the later years of his life. Southern Californians have to thank him for ridding them of the *Icerya purchasi*, which already had nearly ruined a large number of their horticulturists; and Australians, especially South Australians, owe his memory a deep debt of gratitude for his researches into and advice concerning the codlin moth (*Carpocapsa pomonella*), apple and pear 'scab,' and a host of other insect and fungus pests which have afflicted them." The above information and extract is from the Australian 'Garden and Field,' kindly communicated by Miss Eleanor A. Ormerod, who wrote of the deceased as follows:—"Mr. Molineux' obituary notice of Mr. Crawford conveys some idea of his work, but not of the important aid that he gave as a referee and co-operator in investigations as to the history and prevention of attacks which, like that of *Icerya purchasi*, affected the welfare both of Australasia and the U.S.A. Up to the time of his decease, he paid especial attention to the parasites of this wide-spread pest, and his skill as a photographer was utilised with great benefit to his correspondents in illustration of his observations. He was especially on the watch to guard against the introduction of insect infestations into the colony of which he was the entomological care-taker, and from my many years' correspondence with him, I have personal knowledge of the prompt and conscientious exactness with which he devoted himself to such work. He at once procured the most trustworthy information, and brought it forward officially. As a co-operator in such parts of my own work as affected both home and colonial service he was invaluable, —never grudging trouble, or the hardly-pressed time he could so ill spare, to look into the accuracy and serviceableness of every point. During the latter months of his life, when from the increase of his illness the use of crutches had become necessary, he still continued at work, and may truly be said to have died in harness."

THE ENTOMOLOGIST.

Vol. XXIV.] FEBRUARY, 1891. [No. 333.

REMARKS ON *MIANA STRIGILIS*, *M. FASCIUNCULA* AND A PROBABLE NEW SPECIES OF THE GENUS.

By Richard South.

In 1881 I secured a long and variable series of *Miana strigilis* in North Devonshire. Comprised in this series were several specimens which I considered to be merely forms of *M. strigilis*; some of these examples have been sent to correspondents, and at the present time I have but three of them in my collection. Probably these would have continued to grace my series of *M. strigilis* if the suggested identity of that species and *M. fasciuncula* had not aroused my dormant interest in *Miana*, and induced me to look with a critical eye at my series of the two species in question.

The first point upon which I satisfied myself was that confusion of *M. fasciuncula* with *M. strigilis*, or *vice versâ*, was not possible to anyone who would make himself acquainted with the differential characters of these well known and distinct species. My series of each species comprises detachments from several British localities, and careful examination of these has enabled me to tabulate the differences between the two species as follows:—

	M. strigilis.	*M. fasciuncula.*
1. Abbreviated basal line*	distinct	indistinct or absent
2. Area between base and 1st line, and that between 2nd and submarginal lines	differently coloured......	similar in colour
3. Claviform stigma......	large and distinctly outlined in black	inconspicuous and often entirely absent
4. Under surface	some shade of grey suffused with fuliginous	some shade of ochreous suffused with fuliginous

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* Transverse markings are absorbed by the dark ground colour of var. *æthiops*.

Apart, however, from the differences to be found in the markings, the two species are easily separable by other characters alone. Thus, in proportion to the respective length of their fore wings, we find that the thorax of *strigilis* is much narrower than that of *M. fasciuncula* and the latter is not crested. Both sexes of *M. strigilis* have distinct dorsal tufts on the body, but in *M. fasciuncula* these tufts are only found in the male, and are very insignificant even in that sex.

Having convinced myself of the distinctness of these two species, it now remained for me to determine the position of the three specimens I had so long regarded as varieties of *M. strigilis*. Examination of these specimens, which on former occasions when I had looked at them I am bound to confess had been only superficial, was now careful and minute. The result is that I find the specimens are not identical with either *M. strigilis* or *M. fasciuncula*. Neither can they be considered forms intermediate between those two species.

Although very similar to forms of *M. fasciuncula* in colour of ground and markings of fore wings, they can be separated at once from that species by the *strigilis*-like dorsal tufts on the body. It was chiefly owing to the presence of these dorsal tufts, that I supposed the specimens to be aberrations of *M. strigilis*, but they are larger than any example of that species I have ever seen and altogether more robust; the nervures are thicker; the first transverse line is decidedly curved, not unlike the same line in *M. literosa*, and the basal area is more uniformly coloured. I am inclined to think that these pseudo-*strigilis* are forms of a distinct species which so far has been overlooked, and shall be pleased to hear from anyone who may have specimens of a *Miana* which he cannot reconcile with either of the known European species or forms.

THE HABITS AND LIFE-HISTORY OF THE NEW ZEALAND GLOW-WORM.*

By G. V. Hudson, F.E.S.

My first attempt to discover the nature of the New Zealand glow-worm was in January, 1885, when I captured several specimens and recorded them as dipterous larvæ, but, through pressure of other work, did not figure or carefully examine them.

Exactly a year later I had the insect again brought under my notice during a conversation with Mr. E. Meyrick, who told me that he had written a short note on the animal, which is quoted in full in my previous paper (Trans. Well. Phil. Soc. vol. xix., page 62). He stated, as his opinion, that the larva was referable to one of the

* Read before the Wellington Philosophical Society, October 8th, 1890.

Staphylinidæ (Coleoptera), and carnivorous. The light he considered attracted, and the web entangled, minute insects on which he supposed the larva to feed. It will be seen that his supposition as to the nature of the insect is entirely contradicted by subsequent investigation, whilst the latter conjecture has not in any way been corroborated, as we are still entirely in the dark as to the use of either the web or the light to the larva.

During February and March, 1886, I instituted very careful observations on the larvæ, keeping several specimens in captivity. From these I ascertained that the light was not exhibited at all regularly, sometimes being brightest at night and sometimes in the early morning hours. I have since noticed that, in the natural state, the larvæ shine most brilliantly on dark, damp nights with a light N.W. wind.

The web referred to above is suspended in a rocky or earthy niche in the banks of a stream, in the densest parts of the forest. It consists of a thick glutinous thread stretched across the niche, and supported by several smaller threads running right and left, and attached to the sides and end of the cavity. On this the larva invariably rests, but, when disturbed, immediately glides back along the main thread, and retreats into a hole which it has provided at the end of it. From the lower side of this central thread numerous smaller threads hang down, and are always covered with little globules of water, resembling a number of minute silver-beaded necklaces, constituting a conspicuous—though apparently unimportant—portion of the insect's web. It should be mentioned that all these threads are constructed by the larva from a sticky mucus exuded from the mouth.

The organ which emits the light is situated at the posterior extremity of the larva, and is a gelatinous and semi-transparent structure, capable of a great diversity of form. It can be withdrawn or extended at the will of the larva, which, however, can immediately cease to shine without withdrawing it. This action is most likely effected by shutting off the air from the tracheæ ramifying through the "light organ," which being, no doubt, largely composed of phosphorus only, becomes luminous when in contact with the oxygen in the air-tubes. Larvæ cease to shine on very cold nights, in the daytime, and in a room which is artificially lighted.

During my observations in 1886 one of the larvæ disappeared, and I naturally assumed that it had buried itself in the earth, and was undergoing its transformation into the pupa state. This was apparently confirmed by the emergence, in about a month's time, of a fly, which was afterwards identified by Baron Osten-Sacken as *Trimicra pilipes*, the larva of which is well known and has nothing to do with the present insect. It is most unfortunate that a larva of this *Trimicra* should have got into the breeding-cage without my knowing it, and thus deceived me.

Further investigations were instituted at the end of 1886, when I discovered a luminous pupa suspended in one of the webs, which I have since several times reared from the glow-worm, and which is consequently the real pupa. It is a curious animal, and furnished with a large process on the back of the thorax, which is attached to the web, and holds the pupa suspended in the middle of the niche previously inhabited by the larva. The light is emitted from the posterior segment of the pupa, but is much fainter than in the larva, and a distinct organ is not apparent. It is frequently suppressed for days together. This pupa died in a few days, and all the larvæ then under observation also died.

Larvæ were again procured in August, 1888, but this time I did not succeed in getting any of them as far as the pupa stage. I should mention that the larvæ are only to be obtained by walking up the bed of the stream, in the big gully of the Botanical Gardens, at night, with a bull's-eye lantern. A piece of thin stick is rapidly introduced behind the larva, as soon as it is detected, which always adheres to it, and is thus taken away, web and all, and carried home in a tin box, with damp moss, &c.

On September 1st, 1888, I obtained another supply of larvæ, placing them this time in a large bell-glass, with stones and ferns, the bottom of the glass having about one inch of water in it: this I conceived would closely resemble their natural habitat. During all my expeditions I always examined a great number of the webs, and could never find any remains of insects entangled. I also noticed that the largest larvæ were always concealed in the deepest niches in the bank, and frequently behind large cobwebs, where they would stand a poor chance of capturing insects. I also think that there must be a very great mortality among the larvæ, judging from the number of minute ones always observed, in natural conditions, compared with large ones. On December 21st I found that two of the larvæ had changed into pupæ resembling the one I found two years before. These unfortunately became mouldy, and died; and it was not until the following April that I succeeded in rearing the true fly, which I discovered, on the morning of the 4th, standing beside its old pupa-skin. Two enlarged drawings were then made, and forwarded to Mr. Skuse, of Sydney, and Baron Osten-Sacken, of Heidelberg, Germany. Both these gentlemen had been previously furnished with specimens of the larvæ in alcohol. They then expressed their opinion that the fly, of which I sent a drawing, probably did *not* result from the luminous larva, and that it would be desirable to postpone publication until another specimen had been reared. Convinced though I was of the accuracy of the observation of April 4th, I determined to verify it, and again procured larvæ, which all died. On July 10th, 1890, I got about twenty large larvæ, spending upwards of three hours in the bed of the stream: two of these changed during August into pupæ, one of which died, but the other gave rise to another fly exactly resembling the one reared on April 4th, 1889. The circumstances connected with the emergence of this fly are so entirely conclusive that it may perhaps be well to relate them in detail. On examining the pupa at 8 a.m., on the 14th, I observed that it had become much paler in colour. At 2 p.m. I noticed the fly perched on it, with its head down towards the tail of the pupa, *and the extremity of the abdomen of the fly still within the pupa-skin.* In this position it remained until the following day at 5 p.m., when I transferred the fly into a large glass-topped pill-box, which I placed on the table in my sitting-room. On returning to the room at 7 p.m. without a lamp, I was astonished to see the inside of the box brilliantly lit up, the extremity of the fly's abdomen giving out a strong light, about half as bright as that emitted by a full-grown larva. The whole phenomena relating to the emergence of this fly from the pupa, and its subsequent luminosity, were also observed by my brother, who was present at the time, and can fully corroborate these statements if necessary. As this was a female fly I decided to take her up into the big gully in the gardens, where the larvæ are abundant, and see if she would attract males. As soon as I arrived I put the box down in the bed of the stream, and the fly immediately lit up so as to again strongly illuminate the inside of the box. There were lots of larvæ all round, so that I considered it likely there were also flies. After thirty-five minutes I visited the box, but found nothing had arrived. I then left her for ten minutes more, and returned with the same result. During this expedition I again carefully examined many webs of the larvæ, and took a quantity of the mucus from them home, and examined it with the microscope. I could, however, find no trace of insects entangled or their remains. I am quite at a loss to explain either the light or the web, also the food of the larva. I must leave these points for future investigation.

I should mention that the flies reared on April 4th, 1889, and Sept. 14th, 1890, were both females, as it is conceivable that this may have an important bearing on future inquiry as to the use of the light.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

Compiled by T. D. A. Cockerell.

(Continued from p. 8).

Since the first part of the list was written, a good many new records have come to hand, the additional sources of information being as follows :—

(9.) A. Bacot. A MS. list of 77 Lepidoptera, taken by Mr. Bacot, his brother, and Mr. A. Campling, within a radius of a mile from Clapton Station, but on the Middlesex side of the River Lea. The Rhopalocera were mostly caught five or six years ago, but the rest, with the exception of *C. elpenor*, within the last two years.

(10.) A. V. Legros. A MS. list of 114 Coleoptera, taken at Hanwell and other localities.

(11.) Louis B. Prout. A MS. list of Lepidoptera, taken in the Stamford Hill and Tottenham district, at Clapton, and at Tottenham.

12.) There is in the British Museum a most interesting collection of insects, all taken within the precincts of the Museum at Bloomsbury. Many species were taken which are not in this collection, but these are all represented by labels, as Mr. Waterhouse kindly informed me. I have therefore catalogued all the labels as well as the insects in this collection, the result being 305 Coleoptera, 7 Lepidoptera, 2 Hymenoptera, and one Dipteron. The collection makes no attempt to be complete except as regards the Coleoptera, but the number and interest of the beetles found in such an unpromising-looking locality as Bloomsbury is amazing. Concerning some of these beetles, see Mr. E. Waterhouse, in Ent. Mo. Mag., vol. ii. pp. 13, 14 (1865).

(13.) J. C. Melvill. 'The Flora of Harrow,' New Edition, edited by Rev. W. M. Hind. With notices of the birds of the neighbourhood and of the butterflies and moths. (1867).

LEPIDOPTERA.

Papilionidæ.

Papilio machaon, L., "Once seen in Whitton Park," Isleworth (*E. O. Meyers*). Newman gives a Middlesex record in his 'British Butterflies,' p. 153.

Aporia cratægi, L., "Isleworth," reported to Mr. Fenn by Mr. E. O. Myers. I know nothing further about the record.

Pieris brassicæ, L., Clapton (*Bacot*) generally common (*Godwin*), Mill Hill (*South*), Dalston (*Prout*), Isleworth (*Fenn*), Bedford Park (*C. R. Fenn*). *P. rapæ*, L.,Clapton (*Bacot*), generally common (*Godwin*), Mill Hill (*South*), Dalston (*Prout*), Isleworth (*Fenn*), Bedford Park (*Ckll.*). *P. napi*, L., Clapton (*Bacot*), Kingsbury, Old Oak Common (*Godwin*), Mill Hill (*South*), Dalston (*Prout*), Isleworth (*Meyers*), Bedford Park (*J. Gray*).

Euchloë cardamines, L., Old Oak Common (*Godwin*), Mill Hill (*South*), Stamford Hill and Tottenham district (*Prout*), Isleworth (*Meyers*), Bedford Park, (*Miss E. Sharpe*).

Colias edusa, Fb., Clapton (*Bacot*). Generally common in 1867 (*Godwin*), one in 1875, very abundant in 1877, two bred from larvæ in 1877, at Mill Hill (*South*), Isleworth (*Meyers*), Bedford Park, in 1884 (*J. Gray*). *C. edusa* var. *helice*, Hb., West End Lane, Kilburn (*Godwin*). *C. edusa* ab. *duplex*, Ckll., Enfield, 1877; Finchley, 1876; see Entom. 1878, p. 52, and coloured figs.; Entom. 1889, p. 6.

Gonopteryx rhamni, L., Bishop's Wood, Hampstead; Old Oak Common, Kingsbury (*Godwin*); gardens and railway banks, Mill Hill (*South*), Dalston (*Prout*), Isleworth (*Fenn* and *Ckll.*), Bedford Park (*J. Gray*).

*Nymphalidæ.**

Argynnis (*Brenthis*) *selene*, Schiff., "Isleworth" (*Meyers*, reported to *F. Fenn*). There is also a Middlesex record in Newman. *A. adippe*, L., Isleworth (*C. R. Fenn*). *A. paphia*, L., "Enfield Chace, Enfield" (*W. P. Ellis*, Pract. Nat. 1883, p. 131). See also *Henry Walker*, Nat. Hist, Notes, 1882, p. 4. *A. aglaia*, L., "Enfield Chace, Enfield" (*W. P. Ellis*, l. c.)

Melitæa aurinia, Rott., Kingsbury (*F. Bond*, in Newman, Brit. But. p. 42).

Grapta c-album, L., "Isleworth" (*Meyers*), near Edgeware (*F. Bond*, in Newman).

Vanessa polychloros, L., Kingsbury, rare (*Godwin*); Mill Hill, common in 1876, pupæ under branches of fruit-trees (*South*). *V. urticæ*, L., Clapton (*Bacot*), Mill Hill (*South*), generally common (*Godwin*), Dalston (*Prout*), Isleworth (*Fenn*), Bedford Park (*Ckll.*). *V. io*, L., Clapton (*Bacot*), Mill Hill (*South*), generally common (*Godwin*), Dalston (*Prout*), Isleworth (*E. M. Fenn*), Bedford Park, 1886 (*L. M. Cockerell*), and Sept. 1st, 1890 (*Ckll.*). *V. antiopa*, L. There is a record in the 'Flora of Harrow, and it is reported from the New River (*F. A. Walker*, Entom., 1887, p. 177), and near Kinsbury (*F. Bond*, 'Zoologist,' 1847, p. 1791).

Pyrameis atalanta, L., Clapton (*Bacot*), Kingsbury, generally common (*Godwin*), Mill Hill (*South*), Isleworth (*Fenn*). *P. atalanta* ab. *b.*, the red band on upper surface of primaries nearly divided in two a little below its middle. Bedford Park (*Ckll.*). *P. cardui*, L., Clapton (*Bacot*); generally common, but scarce some years (*Godwin*); Mill Hill, observed June, 1877, for the first time, two worn specimens (*South*); Dalston (*Prout*), Isleworth (*Fenn*), Bedford Park, imago (*J. Gray*), and a larva on *Cnicus arvensis*, July 12th, 1885 (*Ckll.*).

Limenitis sibylla, L., Mill Hill one recorded in Entom. 1874 (*South*).

Apatura iris, L., Caen Wood, near Hampstead (*J. F. Stephens*, see Newman, p. 76).

Melanargia galatea, L., Mill Hill, railway bank, 1875; two in orchard, 1876 (*South*).

Pararge megæra, L., Clapton (*Bacot*); edge of Bishop's Wood, Hampstead (*Godwin*), Mill Hill (*South*), Isleworth (*Meyers*).

Satyrus semele, L., recorded in the 'Flora of Harrow.'

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* Including, as subfamilies, *Apaturinæ* and *Satyrinæ*.

Epinephele ianira, L., Mill Hill (*South*), Clapton (*Bacot*), Old Oak Common, in profusion (*Godwin*), Dalston (*Prout*), Isleworth (*Fenn*), near Ealing (*Ckll.*). *E. tithonus*, L., Clapton (*Bacot*), Mill Hill (*South*). *E. hyperanthes*, L., "Isleworth" (*Meyers*).

Cœnonympha pamphilus, L,. Clapton (*Bacot*), generally common (*Godwin*), Mill Hill (*South*).

Lycænidæ.

Thecla rubi, L., one example, Acton Lane, Acton side of Old Oak Common (*Godwin*). *T. quercus*, L., Mill Hill, one larva beaten from oak in the garden (*South*).

Chrysophanus phlœas, L., Clapton (*Bacot*), Mill Hill (*South*), generally common (*Godwin*), Stamford Hill, &c., district (*Prout*), Isleworth (*Fenn*), Bedford Park (*J. Gray* and *L. M. Cockerell*). *C. phlœas* ab. *fasciatus*, Ckll., Finchley (*W. P. Weston*), see Entom. 1878, p. 25, and 1889, p. 99.

Lycæna ægon, Schiff., Scratch Wood (*F. Bond* in Newman. *L. astrarche*, Bgstr., one in a field near farm, Mill Hill, 1875 (*South*); "Isleworth" (*Meyers*). *L. icarus*, Rott., generally common (*Godwin*), Mill Hill (*South*), Clapton (*Bacot*), Dalston (*Prout*), Isleworth (*C. R. Fenn*), Bedford Park (*Ckll.*). *L. corydon*, Fb., Old Oak Common, one example, end of July, about 1869 (*Godwin*). *L. argiolus*, L., Hampstead Heath, three specimens (*Godwin*), Mill Hill (*South*).

Hesperidæ.

Syrichthus malvæ, L., Old Oak Common, Kingsbury; foot of Hampstead Heath, towards Hendon; Dolton Hill (*Godwin*), Mill Hill, in a hollow at the back of Bunn's Farm (*South*). *S. malvæ* var. *taras*, Meig., four or five at Old Oak Common, smaller than type (*Godwin*).

Pamphila thaumas, Hufn, Old Oak Common (*Godwin*), Isleworth (*Meyers*). *P. sylvanus*, Esp., Old Oak Common (*Godwin*), Mill Hill, on the common (*South*). *P. comma*, L., Old Oak Common (*Godwin*).

Sphingidæ.

Acherontia atropos, L., Mill Hill, one pupa found (*South*), Isleworth (*E. O. Meyers*).

Sphinx convolvuli, L., Mill Hill, two netted, flying over flowers (*South*); Blenheim Passage, St. John's Wood, in 1869, one specimen (*Godwin*); Bedford Park, one specimen in 1885 (*F. Nash*), Isleworth (*Meyers*). *S. ligustri*, L., Mill Hill, larva on privet (*South*); generally common (*Godwin*); Woodstock Road, Bedford Park (*Fenn*) Isleworth (*Meyers*); larvæ common at Ealing, 1879 (*R. South*).

Deilephila galii, Schiff., see Entom. 1888. p. 210 and p. 274.

Chœrocampa nerii, L., see Entom. 1888, pp. 258 and 265, and 1889, p. 120. *C. porcellus*, L., Mill Hill, two specimens (*South*). *C. elpenor*, L., Clapton, about fifteen years ago (*Bacot*).

Smerinthus ocellatus, L., Hampstead Heath and Kingsbury (*Godwin*); Mill Hill, larvæ rather common on apple, sallow, and willow (*South*); Bloomsbury (*Brit. Mus.*), Bedford Park (*J. Gray*), Isleworth (*Meyers*). *S. populi*, L., generally common (*Godwin*), Mill Hill, larvæ on poplar (*South*), Bloomsbury (*Brit. Mus.*), Bedford Park (*L. M. Cockerell* and *J. Gray*), Stamford Hill and Tottenham district (*Prout*), Clapton (*Bacot*); St. John's Wood, sometime common, especially in larval stage (*South*); Isleworth (*Meyers*). *S. tiliæ*, L., The Butts, Brentford, a larva under a lime tree, Aug., 1890 (*Fenn*); Clapton (*Bacot*), generally common (*Godwin*); Mill Hill, larvæ on elm, also pupæ, elm (*South*); Bedford Park (*J. Gray*); Isleworth (*Meyers*); St. John's Wood, some years larvæ not uncommon, imago not often seen (*South*).

Macroglossa stellatarum, L., Mill Hill, several (*South*); moderately common (*Godwin*), Isleworth (*Meyers*), St. John's Wood, several times seen (*South*).

Hemaris fuciformis, L., Westbourne Park Station (*H. Walker*, Nat. Hist. Notes, 1882, p. 4). The occurrence of this insect in London is explained by the supposition that it had flown on to an up train somewhere, and thus been carried to town. The genus *Hemaris*, Dalman (1816), seems a well-defined one, as distinct from *Macroglossa*, Och. (Should not this be *Macroglossum*, Scop., 1777 ?).

It is intended next to treat of the following groups:—Lepidoptera: *Sesiidæ*, *Zygænidæ*, *Bombyces*, *Pterophori*. Coleoptera: *Aleocharinæ*, *Longicornia*, *Chrysomelidæ*, Diptera: *Syrphidæ*. Information about any of these will be gladly received.*

In some instances above I have given only the name of the collector as authority, contrary to my first intention. This is done in the case of several Bedford Park insects, some of which were not identified or recorded by the collectors themselves.

(To be continued.)

NOTES ON BRITISH LEPIDOPTERA; EXTRACTED FROM CONTINENTAL JOURNALS.

By W. Warren, M.A., F.E.S.

In the 'Stettiner Entomologische Zeitung' for 1890, January to June, there occur some notices of Micro-Lepidoptera, the perusal of which should, I think, be of interest to British collectors. The extracts here given are, it must be understood, a condensed summary of the chief items of information.

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* Records may be sent to the compiler, at 3, Fairfax Road, Bedford Park Chiswick, W.

On pp. 48 and 49 there are described, by Herr C. A. Teich, of Riga, two new varieties of *Penthina* (*Sericoris*), viz., *P. rivulana*, Scop., var. *stangeana*, and *P. lacunana*, Scop., var. *hoffmanniana*, both of which occur along the shores of the Baltic. The first of these, var. *stangeana*, differs from the type form by (i) its smaller size (13—14 mm. against 16—18 mm.); (ii) its darker colour (brownish black with olive dusting, instead of olive with black dusting); (iii) the dulness of the silvery lines; and (iv) the deeper tint of the hind wings, and under side generally. The other var., *hoffmanniana*, differs likewise from the typical form of *P. lacunana* (i) in point of size (13—15 mm. against 18 mm.); (ii) in its brighter tints (the cross-bands being pale yellowish white, not so much dusted with darker as in the stem form, and with their central metallic line brighter blue); (iii) in having the submarginal dark shade, which runs from the apex to the inner margin, divided by an elbowed pale line, starting from the penultimate gemination; (iv) in having the hind wings and under side darker. This form appears to me to be identical with our Cambridgeshire fen specimens, which, however, are *not* smaller than the usual examples of *lacunana*.

On p. 53 we find some remarks on larvæ of Micro-Lepidoptera, by Herr F. Eppelsheim, of Grünstadt, some of which are decidedly interesting:—

Perinephele lancealis (the long-winged pearl).—"Larva stated to occur, viii. e., ix. b., on the under side of rolled leaves of *Teucrium scorodonium*." The only plant, hitherto, I believe, given for this larva is *Eupatorium cannabinum*, on which it always feeds in England.

Acrobasis sodalella.—"Larva on oak in the second half of May, *earlier* than its two allies, *consociella* and *tumidella*. Its mode of feeding differs; instead of spinning the oak leaves *flatly* together, as the other two species both do, it makes a cluster of them. The larva itself is described as striped with brownish black and white, the stripes being of uniform width, and the dorsal one brown; head black, with yellow speckles; thoracic segment shining black, with a white edge in front; anal flap and hind legs of the ground colour; fore legs black. Imago emerges from the second half of June, onwards."

Homœosoma cretacella, Rössler (= *senecionis*, Vaughan).—"Larva in heads of species of *Senecio*, drawing several flower-heads together with a web, mixed with excrement; differing therein from the larva of *H. nimbella*, which bores into a single flower, and remains concealed therein, the only indications of its presence being the protrusion of some of the dislodged florets."

Conchylis (*Eupœcilia*) *ambiguella*.—"Additional food-plants recorded: Red currant and snowball (*Symphoricarpus racemosus*), in the fruit and berry; *Dianthus carthusianorum*, in the seed-heads."

At p. 57, Herr H. Disqué, of Speier-on-the Rhine, gives a description of the larvæ of *Psamotis pulveralis*, Hüb., and *Acentropus niveus*, Ollivier:—

Psamotis pulveralis.—"Larva: ground colour grey, with violet-red stripes; six black white-rimmed warts on each segment; head marbled, dark and light brown; thoracic segment black, divided down the middle, where it is paler; anal segment pale brown. A female, taken in the beginning of August, laid eggs, which hatched in about a fortnight's time, and produced three imagos at the end of September; these were bred in-doors. The majority of the larvæ died through being kept too dry." Is there, under *natural* conditions, a regular second brood? Can the Folkestone collectors answer?

Acentropus niveus.—"Larva with sixteen feet; dirty whitish; head and thoracic segment inclining to yellowish; the 4th to 8th segments clouded, laterally, with brownish. Living free, on leaves, or enclosed, like the pupæ, in a whitish web, on *Ceratophyllum demersum.* Of gills, through which the larvæ are said to breathe, no traces were to be seen. Except for size, they are very much like the larvæ of *Hydrocampa stagnata.* Larvæ and pupæ were found in the beginning of May, and also in autumn. Imagos, likewise, in August. The larvæ were found, but more sparingly, feeding also on other water-plants,—*Myriophyllum*, *Trapa natans*, and species of *Potamogeton.* The whitish cocoons containing the pupæ were visible a yard below the surface of the water, fastened to the axils of the leaves. From as many as 100 larvæ and pupæ collected, and which produced imagos in fair numbers, only a very few females were bred. The female imagos sat under water on a leaf, and there kept waving to and fro their stumps of wings. In order to set them, it was necessary to remove them straight from the water to the setting-board, otherwise the wings became, as it were, glued to the body." Herr Disqué records a fact, connected with the powers of flight of this species, which astonished him:—"He was sitting one night on an elevated piece of ground, at least three-quarters of a mile from the haunts of *A. niveus*, when a specimen fell at his feet, attracted apparently by the glare of an electric-light close by. As a rule, the males never rise far above the surface of the water they frequent."

At p. 81, the same writer describes the larvæ of some Tortrices and Tineina, which were previously, as far as I am aware, unknown:—

Teras fimbriana, Thnbg.—"Larva full-fed, viii. e.; to be found between united leaves of sloe; greenish yellow; head pale brown; thoracic and anal segments like the body. Imago emerged, ix. e.—xi. m."

T. lubricana, Mn.—"Larva dirty grey; head black; thoracic segment brown, black on the sides; less frequently entirely black; fore legs black; anal legs of the ground colour: v. e. in a web, just like that of *Tortrix rosana*, which occurred at the same time on the same sloe bushes. Imago, vi. e."

Tortrix murinana, Hüb.—"Larva green; head and thoracic segment black; anal plate like the ground colour; six black warts on each segment. Bred from the neighbourhood of Baden, where the larvæ had destroyed whole fir plantations."

The last three species have not yet been recorded from Great Britain; but there seems no reason why, as their food-plants are so common, they may not occur with us. It appears that in Germany they are all very local.

Grapholitha microgrammana.—"Larva, viii. e. ix. b., in the still green seed-pods of *Ononis spinosa:* yellowish white; head pale brown; thoracic segment paler, with black dots; the six usual warts on each segment slightly darker, hardly visible; anal plate of the ground colour. Imago, vi. e. vii. b." The imago has been bred in England from small oval sand-cocoons found under *Ononis*, and caught flying always over that plant. The larvæ were suspected to feed in the seed-pods; but, as far as I know, had not been actually detected therein.

Symmoca signatella.—"The imagos were found tolerably commonly, vi. e. vii. b., resting on the trunks of an old lime tree, and singly on oak and plum stems. The larva, which is slender and full-fed, vi. b., lives in the chinks of the bark under a slight web, feeding probably on lichens. It is very difficult to get it out of its hiding-place. In appearance it bears much resemblance to the larva of *H. bracteella*, being grey, with scarcely visible paler warts; head and thoracic segment black-brown; on the 1st segment (? 3rd) are four chitinous brown dots, the two lower being the larger; anal plate grey-brown. Pupa among the bark in a slight web." This account is peculiarly interesting just now, as the species has lately been taken in the London neighbourhood by Mr. A. F. Griffith, of Brighton.

The only paper in the first two numbers of the 'Tijdschrift voor Entomologie' for the present year, that will have any interest for British lepidopterists, is a critical monograph, by Herr P. C. T. Snellen, on the genus *Hypenodes*, Guen. He distinguishes this genus from *Hypena* by the differently shaped terminal joint of the palpi. In *Hypenodes* this is conical and upright; in *Hypena*, flattened and blunter. Eight species are enumerated as belonging to the genus, viz.:—*H. costæstrigalis*, Steph.; *H. tænialis*, Hüb.; *H. kalchbergi*, Staud., S. E. Z., 1876, p. 139, from Sicily, Macedonia, and Derbent; *H. balneorum*, Alpheraki, Hor. Ross., 1879, p. 137, from the Caucasus; *H. jucundalis*, Snell., Tijd. v. Ent. xxiii. p. 121, xxiv. pl. 5, fig. 10, from Celebes; *H. pudicalis*, Snell., Tijd. v. Ent. xxxiii. p. 178, pl. 7, fig. 9; *H. minimalis*, Snell., *loc. cit.*, fig. 10, both from Celebes and Java; *H. obliqualis*, Snell., *loc. cit.*, p. 179, fig. 11, from Java. The synonymy of our two British species, as carefully worked out by Herr Snellen, I give in full:—

Hypenodes costæstrigalis.

Cledeobia costæstrigalis, Steph., Ill. iv. p. 20, 1834; Wood, Ind. Cat. fig. 772, 1849; de Graaf., Bouwst. iii. p. 57, 1862.

Hypenodes costæstrigalis, Guen., Delt. & Pyr. p. 42, 1854; Staint. Man. ii. p. 129, 1859; Snell., Vlind. p. 494, 1867.

Hypena tænialis, H.-S., Panzer, Deutch. Ins. 166, 1, 1839.

Cledeobia acuminalis, H.-S. ii. p. 442, fig. 619 (pars.), 1845.

Hypenodes tænialis.

Pyralis tænialis, Hüb., Pyr. fig. 151, 1796.

Crambus albistrigatis, Haw., Lep. Brit. p. 368, 1810.

Cledeobia albistrigatus, Steph., Ill. iv. p. 20, 1834; Wood, Ind. Cat. fig. 771, 1839.

Hypenodes albistrigalis, Guen., Delt. & Pyr. p. 42, 1854; Staint. Man. ii. p. 128, 1859; Hein., Schm. D. i. p. 620, 1859; Snell., Tijd. v. Ent. xxx. p. 219, 1887.

Hypena acuminalis, H.-S., Panzer, Deutsch. Ins. 163, 2, 1839.

Cledeobia acuminalis, H.-S. ii. p. 442, fig. 619 (pars.), 1845; Wocke, Bresl. Zeits. Ent. pl. 5, fig. 16, 1850.

(To be continued).

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. Perry Coste, F.C.S.

Continued from p. 15.

V.—The Chemical Aspect. F. (*continued*).

Passing now to the simply yellow species, we have some very interesting considerations forced upon us. First of all, as to the genus *Euchloë:* in *E. cardamines* we see an exceedingly soluble orange pigment. Now there is an extra-British species, *E. eupheno*, in which the ground colour is yellow, whilst the tips are red: this is a species on which I have not experimented, and its behaviour can therefore only be surmised. The red would, of course, be instantly changed to the ground yellow, but the real interest centres in the question, what next? The analogy of nearly every red species points to the answer that the yellow (both that already existing and that produced by the transformation of red) would remain unaffected: but, on the other hand, the exceptional behaviour of *Delias* reminds us that it is not impossible that the total yellow might dissolve away entirely; whilst the relationship of *eupheno* to *cardamines*, with its highly soluble pigment, lends some support to this possibility. We can, then,—failing actual experience,—only reserve our decision.

Next, as to *Gonopteryx: G. rhamni* is in the halfway condition (column 2 on p. 9) between the species with soluble yellow pigment and those with stable. And, correlated with this. we have the very interesting fact that in the sister species, *G. cleopatra*, there is already a red flush at the base of the primaries. No doubt this red would at once be turned to yellow, and we may fairly legitimately conclude that the total yellow would be even less affected than in *G. rhamni*.*

Next, in *Colias*,† we have converse instances: the yellow is exceedingly soluble, and there are (at least so far as I am aware) *no red species* in this genus. But—to repeat my warning—we must not fall into the error of applying this fallible criterion too indiscriminately. *Colias* affords an illustration and a warning: for although there may be no red species in the genus, one or two extraordinary red or reddish varieties are reported of *C. edusa*:‡ and a further illustration of the progress which the *Colias* pigment is making towards red may be found not only in the one or two reddish spots and borders which occur on the wings, but also in the remarkable artificially-produced red obtained by Mr. Edwards.

With regard to the remaining yellow species, *L. alexis* calls for no particular comment: and the Arctiidæ have been already disposed of. As to the half-dozen Geometrine species, I will merely point out that whilst in none of them is the yellow rapidly dissolved in the satisfactory fashion that prevails with *edusa*, *cardamines*, and *Delias*, yet, *in not a single case* is it entirely obdurate: in no instance at present to hand has the Geometrine yellow reached the *stable* stage: and correlated with this we have the fact that *red* is *almost unknown* in Geometræ. I am very anxious not to insist on this coincidence, or over-rate its importance, since, in the present state of our knowledge, and without examining a far larger number of species, it is impossible to decide whether this be anything deeper than a coincidence: but at least it is *prima facie* very significant.

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* Only since this was in type have I seen actual specimens of *E. eupheno* and *G. cleopatra*: the colour which had been described to me as "red" is, I find, simply deep orange, and in the former species apparently identical with the orange of *cardamines*, with which, no doubt, it would agree in its reactions. As to *cleopatra*, Mr. Warburg informs me that he has experimented thereon, and found the orange to "disappear marvellously, the bright and intense orange being transformed to a paler shade than the natural colour of the female." Nothing is said, however, as to the effects on the *ground yellow*; but, since Mr. Warburg has sent me specimens of *cleopatra*, I shall be able to clear up this matter immediately.

† In this section I had intended to redeem my promise of giving the details of the experiments made in reddening the yellow of *Colias*. (See Entom. xxiii. 235). Since my note on this subject, last July, I have continued the experiments, and have obtained most unexpected and interesting results. A full account of these was written out, as appendix to this subsection; but, owing to the length to which this ran, it has been found necessary to hold it over for the present.

‡ For instance, Mr. Anderson describes a specimen displaying a "glowing *rosy* violet" tint. Entom. xxii. p. 72.

I might, perhaps, add that many of these Geometrine yellows are on the very border-land of yellow, and might with almost equal justice be described as chestnut, with which, too, their reaction betokens a strong similarity. They afford an additional example to those presently to be adduced, of the close relations in constitution between chestnut and yellow.

There remain, then, only the remarkably impervious *T. pronuba* and its miniature analogue, *Heliaca tenebrata.* I suppose that, *à priori,* every one would have anticipated, as I did, that the magnificent orange of this species,—*T. pronuba,*—would be rapidly affected by reagents; but, as a matter of fact, I cannot touch it. After all the preceding remarks in this section on the character of yellows, it may probably be considered very safe to refer this species to the subclass of those possessing a stable yellow pigment; but, as a matter of fact, I think we shall exercise a wise caution in withholding any such judgment until further evidence be forthcoming. The case is peculiar, since, unlike the apparently similar instance of *villica,* &c., we have here no collateral evidence. I can see no reason why there may not be a "physical absorption " yellow as well as pigment yellows ; and, granting this, we have absolutely no proof that *pronuba*-yellow is not such. The doubt might be cleared in two ways : in the first place, the existence of a *red* species (or even a red variety) in the genus would settle the matter at once—as in the Arctiidæ—in favour of pigments; or, secondly, if other yellow species of *Triphæna* were found to be affected, as is *Catocala cerogama,* that also would be tolerably conclusive. At present I have examined no other species of *Triphæna,* but my impression is rather that the wings of the less brilliant species are more suggestive—in superficial appearance—of physical colours than of pigments. Anyhow, for the present we must leave this question an open one.

And finally, now to complete the consideration of red and yellow, we have yet to take into account the intensely interesting subject of *reversible effects,* which, so far as I at present know, are displayed by this colour—red—alone. Perhaps the simplest manner of explaining this will be to proceed historically,—following the order of my discoveries. We will start from the fact that all reds are turned yellow,—by acids especially. Wishing to preserve a few permanent preparations of these artificial varieties, I soaked the wings of one or two perfect insects, *Euchelia jacobææ* and *Zygæna filipendulæ,* with hydrochloric acid, washed them with water to remove the acid, then with alcohol (perhaps—but I am not sure now) to assist the drying, and when dry put them away in a store-box. On opening this some time afterwards I found, to my utter disgust, that my beautiful yellow varieties had *reverted to their original red.* Of course, it is scarcely necessary to say, that I saw at once the great importance of this unlooked for phenomenon, and the consequent necessity for a thorough and exhaustive examination of the relations between red and yellow: a development as unexpected as discouraging, coming as it did at a time when I fancied myself to be pretty well acquainted with the phenomena of the red pigment. At this time my articles were already in course of publication in the 'Entomologist'; and not knowing what modifications in views already foreshadowed might be necessitated by this new departure, I inserted,—in order to guard myself somewhat,—the footnote on p. 186 as to the "after phenomenon," confining it, however, to the case of hydrochloric acid; at the last moment, before this was published, I obtained further results, which led me to add, "and other acids." We will now consider the question in detail.

Three, and only three, explanations seemed possible, of this reversion to the original red: it might be a *time* effect pure and simple: it might be due to washing with water; or to washing with alcohol.

I first made a set of experiments with *Z. filipendulæ*—

A. & B. Wings were exposed to HCl for one hour.

C. Similar exposure for two hours.

D. Similar exposure for *one* week.

In each case a parallel experiment was made with HNO_3 in order to determine whether the reversion phenomenon was or was not confined to specimens originally transformed by HCl.*

The wings, at the expiration of their periods of exposure, were respectively treated as follows:—

A. By merely washing with distilled water a large part of the red returned there and then *in the* HCl *specimen.* The HNO_3 specimen remained *immovably yellow.*

B. Washed as above, then with alcohol, and finally left standing in alcohol.

C. Simply washed as with A., and with the same result. The HCl specimen recovered its red; the HNO_3 remained yellow. But on examining these A., B. and C. (HCl) specimens after a lapse of 24 hours, I found that they were again yellow; and at the end of a week still yellow (C. orange). But on washing again with water the red was *partly restored.*

All the HNO_3 specimens had retained their yellow from first to last.

D. The HCl specimen (after one week's exposure to acid), was *at once restored to red* by simple washing,

The HNO_3 specimen remained immovably yellow.

A., B. (or C.) and D. HCl specimens, after having regained their red, as above related, were left alone for a week. At the end of that time they were still the full red.

The HNO_3 specimens of course had retained their yellow.

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* This whole set of experiments was made in the same mode as usual, *viz.*, by treating wings gummed on to watch-glasses.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

Notes on the Season, 1890.—The experience of many entomologists seems to be that Lepidoptera have been scarce during the past season, but, as far as I am concerned, the year 1890 has been quite up to the average; at least as regards numbers. I append a list of some of my captures in Enfield. From pupæ obtained at the roots of oak trees during the winter, I bred *Tæniocampa gothica*, *T. incerta* (*instabilis*), and *T. stabilis* freely; also *Phigalia pedaria*, two females of which emerged in January. In March I captured *Amphidasys strataria*, and males of *Hybernia marginaria* were to be had in plenty at the street-lamps. Two specimens of *Smerinthus populi* emerged in May; and on the 10th of that month I caught a stray *T. gothica* at a street-lamp, although the last of those I had bred emerged on the 5th of April. During May insects were very abundant, notably *Euchloë cardamines*, *Nisionades tages*, and *Euclidia glyphica*: of these three species I could have taken hundreds. *Syrichthus malvæ*, *Heliodes tenebrata* (*arbuti*), and *Euclidia mi* were fairly common. Two specimens of *Dicranura vinula* and one of *Acronycta megacephala* emerged early in June from pupæ obtained the previous year; I also bred *Metrocampa margaritaria* from larvæ beaten off hornbeam in May. *Noctua augur*, common; *Hepialus humuli*, twice taken; *Plusia iota*, once. Larvæ, as a rule, were scarce; but *Miselia oxyacanthæ* larvæ were not uncommon, and those of *Diloba cæruleocephala* and *Bombyx neustria* were extremely abundant; on the 7th of June I took two nests (numbering about 150 individuals) of the latter off one sloe-bush. Most of the common species of Rhopalocera were fairly abundant, with one striking exception: *Hesperia sylvanus* appeared in its usual numbers; but of *H. thaumas* (*linea*), usually so common during the latter part of June, I did not see a single specimen during the whole of the year. In July my chief captures were *Phorodesma pustulata* and *Hemithea strigata*; also *Plusia chrysitis* and *Pericallia syringaria* at syringa-bloom, which is considerably more efficacious than sugar while it lasts. Perhaps the most abundant moths were the day-flying *Eubolia limitata* (*mensuraria*) and *Cidaria associata* (*dotata*); this latter flying over our currant-bushes during the evening. In August I sugared vigorously and frequently; but the only species rewarding my exertions were:—*Amphipyra pyramidea* (fairly common, though not nearly so much so as in former years), *Mania typica*, *M. maura*, *Calymnia affinis* and *C. diffinis*, *Boarmia gemmaria*, *Noctua xanthographa*, *Triphæna comes* and *T. pronuba*, and, "last, but not least," *Xylophasia monoglypha* (*polyodon*). On the 15th of the month I found a batch of ova of *Arctia caia* on willow; this is the second time I have found them on this plant; I usually find the larvæ on stinging-nettle, and feed up nearly all my larvæ on it. I have never seen either of these food-plants mentioned before, although I have never found the larvæ on any other plant, except the common dead-nettle (*Lamium album*). The first fortnight of September I spent at Lowestoft, where I took the following species at gas-lamps:—*Bryophila perla*, *Luperina testacea*, *Melanippe fluctuata*, and *Pionea forficalis* (common); also single specimens of *Porthesia* (*Liparis*) *similis* (*auriflua*), *Mania maura*, and *Eugonia* (*Ennomos*) *fuscantaria*. On the 12th of this month I caught a specimen of *Eubolia limitata*; in Enfield I never see it later than the first week of August, and it is most abundant at the beginning of July. I returned home on the 14th, and found a larva of *Smerinthus ocellatus* awaiting me. A day or two after I took a *Polia flavicincta* at sugar. In October my only captures were *Anchocelis pistacina* and *Miselia oxyacanthæ*. In November I took *Phlogophora meticulosa* at ivy-bloom; and *Himera pennaria* and *Cheimatobia brumata* at gas-lamps.—H. D. Sykes; The Cedars, Enfield, Middlesex, Dec. 10, 1890.

Notes from the New Forest.—On May 31st, 1890, my brother and I took up our quarters at Brockenhurst for a week's collecting. Unfortunately, the weather was not all that could be desired, the greater part of the week being rainy and dull, so that butterflies were not abundant. *Argynnis euphrosyne* showed itself freely whenever there was a gleam of sunshine; and towards the end of the week *A. selene* began to appear. *Nemeobius lucina* was locally plentiful, and one morning we took eight specimens. Only two examples of *Thecla rubi* put in an appearance, but that was probably owing to the dull weather. *Gonopteryx rhamni*, in a battered condition, was fairly common. *Euchloë cardamines* not so plentiful as usual, but the males and females in about equal proportions. Beating produced a few moths:—*Drepana hamula, D. falcula, D. lacertula, Zonosoma punctaria*, and *Epione advenaria*, from oak and birch; while *Bupalus piniaria* and *Thera obeliscata* swarmed about the pines. From the heaths, *Bombyx rubi* and *Phytometra ænea* in hundreds, amongst which were some exquisite specimens, and *Scodiona belgiaria*. A bright, sunny day produced *Macroglossa fuciformis* in tolerable abundance; *M. stellatarum* and *M. bombyliformis* (one specimen only). Other captures were, *Dasychira pudibunda, Tanagra chærophyllata, Bapta taminata, Anaitis plagiata*, &c. By beating, the following larvæ were obtained:—*Thecla quercus, T. betulæ, Pœcilocampa populi, Trichiura cratægi, Eriogaster lanestris, Miselia oxyacanthæ, Asteroscopus cassinea, Hypsipetes elutata*, in countless numbers, &c. Accompanied by a cousin, Mr. R. E. James, a second visit was made in the middle of July, from the 12th to the 19th of the month; *Argynnis paphia* and *Limenitis sybilla* were out in large numbers and in beautiful condition, and among the latter my cousin was fortunate enough to capture a fine specimen of the black variety. The females of *A. paphia* were not well out, and we only took three specimens of the variety *valesina*. *A. adippe* and *A. aglaia* were fairly plentiful; *A. selene* and *Lycæna ægon* were common on the heaths; and among the swarms of *Epinephele ianira* we took several "bleached" varieties. A few *Nemeophila russula* from heath. The only Noctuæ taken were *Plusia iota, Aplecta nebulosa, Agrotis porphyrea, Leucania lithargyria*; treacling being a total failure. Among the Geometræ were captured, *Ellopia fasciaria, Boarmia roboraria, Pseudoterpna cytisaria, Phorodesma bajularia*, and *Boarmia repandata* var. *conversaria*. The following larvæ were also obtained:—*Hadena proteus, Cidaria miata, Saturnia carpini*, and *Macroglossa fuciformis*; five specimens only of the latter, and all unfortunately proved to be ichneumoned. Among Coleoptera, *Cicindela campestris* and *Lucanus cervus* were very abundant; and a specimen of *Calosoma sycophanta* was captured.—William J. Ogden; 93, Clapton Common, N.E.

The Cheshire Plague of Caterpillars.—If Mr. Newstead will do me the favour to again read my remarks (Entom. xxiii. 293), he will find that my expression, "extraordinary appearance of caterpillars," is synonymous with what it clearly refers to, *viz.*, "plague of caterpillars." He writes (Entom. 19), "I do not wish to convey to the reader the idea that we had a plague of caterpillars, in the true sense of the word." Clearly, then, for anyone to say we had such a plague would be to say what was untrue, which is exactly my case,—"Quod erat demonstrandum!" Some readers will have probably noticed two points in this controversy. First, the editor's note on "A Plague of Caterpillars," with invitation to correspondents, appeared in the August number of the 'Entomologist.' Although devoted to the study of Economic Entomology, more than three months elapse before Mr. Newstead says anything on the subject; and then, when he does write, on November 20th, it is to nullify evidence carefully collected, and perfectly consistent with the character of the past season. Secondly, he gives no localities. It is, therefore, impossible to test the scope or accuracy of a single case that he quotes.—J. Arkle; 2, George Street, Chester. [We feel sure that each correspondent, who has kindly communicated with us upon this subject, has simply stated such facts as were either within his own knowledge or obtained from trustworthy sources.—Ed.]

The Illuminated Moth-trap.—The following is a completed list of Lepidoptera taken in illuminated moth-traps at Watergate, in the years 1887 to 1890, inclusive. Only in the present year have the traps been used after the end of July:—*Sphinx ligustri*, *Nola confusalis* (*cristulalis*), *N. mundana*, *Lithosia mesomella*, *Euchelia jacobææ*, *Arctia caia*, *Spilosoma lubricipeda*, *S. menthastri*, *Hepialus lupulinus*, *H. velleda* and var. *carnus*, *H. hectus*, *Psilura monacha*, *Dasychira pudibunda*, *Pœcilocampa populi*, *Drepana falcataria* (*falcula*), *Cilix glaucata* (*spinula*), *Lophopteryx camelina*, *Notodonta trepida*, *Phalera bucephala*, *Cymatophora duplaris*, *Demas coryli*, *Acronycta ligustri*, *Leucania conigera*, *L. lithargyria*, *L. impura*, *L. pallens*, *Hydrœcia nictitans*, *Xylophasia monoglypha* (*polyodon*), *Neuronia popularis*, *Cerigo matura* (*cytherea*), *Luperina testacea*, *Mamestra persicariæ*, *M. didyma* (*oculea*), *Caradrina taraxaci* (*blanda*), *Rusina tenebrosa*, *Agrotis segetum*, *A. corticea*, *A. cinerea*, *Noctua triangulum*, *N. stigmatica* (*rhomboidea*), *N. festiva*, *Amphipyra tragopogonis*, *Tæniocampa gothica*, *Cosmia trapezina*, *Dianthœcia nana* (*conspersa*), *D. cucubali*, *D. carpophaga*, *Cleoceris viminalis*, *Aplecta advena*, *Hadena adusta*, *H. dentina*, *Asteroscopus sphinx* (*cassinea*), *Plusia chrysitis*, *P. v-aureum*, *P. gamma*, *P. moneta*, *Toxocampa pastinum*. Geometræ: — *Epione advena*, *Rumia luteolata* (*cratægata*), *Metrocampa margaritaria*, *Eurymene dolobraria*, *Pericallia syringaria*, *Selenia bilunaria* (*illunaria*), *S. tetralunaria* (*illustraria*), *Odontoptera bidentata*, *Crocallis elinguaria*, *Eugonia quercinaria* (*angularia*), *Himera pennaria*, *Hemerophila abruptaria*, *Cleora lichenaria*, *Boarmia repandata*, *B. abietaria*, *B. roboraria*, *Tephrosia crepuscularia* or *biundularia* (perhaps both), *T. luridata* (*extersaria*), *T. punctularia*, *Geometra papilionaria*, *G. vernaria*, *Iodis lactearia*, *Zonosoma porata*, *Z. linearia* (*trilinearia*), *Z. annulata* (*omicronaria*), *Asthena sylvata*, *Acidalia dimidiata* (*scutulata*), *A. bisetata*, *A. marginepunctata* (*promutata*), *A. remutaria*, *A. imitaria*, *A. aversata*, *Timandra amataria*, *Cabera pusaria*, *C. exanthemaria*, *Aleucis pictaria*, *Strenia clathrata*, *Panagra petraria*, *Numeria pulveraria*, *Abraxas grossulariata*, *Ligdia adustata*, *Lomaspilis marginata*, *Hybernia aurantiaria*, *H. defoliaria*, *Cheimatobia brumata*, *Larentia didymata*, *L. viridaria* (*pectinitaria*), *Eupithecia oblongata* (*centaureata*), *E. plumbeolata*, *E. nanata*, *E. vulgata*, *Hypsipetes sordidata* (*elutata*), *Melanthia ocellata*, *M. albicillata*, *Melanippe unangulata*, *M. rivata?*, *M. sociata* (*subtristata*), *M. montanata*, *M. fluctuata*, *Anticlea badiata*, *A. nigrofasciaria* (*derivata*), *A. ferrugata*, *Phibalapteryx tersata*, *P. vitalbata*, *Cidaria corylata*, *C. truncata* (*russata*), *C. immanata ?*, *C. fulvata*, *C. dotata* (*pyraliata*), *C. associata* (*dotata*), *Eubolia limitata* (*mensuraria*), *E. plumbaria* (*palumbaria*), *E. bipunctaria*.—About 130 species. The season of 1890 has not been a good one for light. There have been very few favourable nights, and it has only been by the use of two traps, and their being almost constantly at work, that I have obtained so many species by means of the attraction of light. As it may be of interest, I append particulars, meteorological and otherwise, of three of the best nights this year. May 20th.—Warm, several violent squalls, with drenching rain, during the night:—*E. dolabraria*, 1; *M. montanata*, 1; *A. remutata*, 2; *T. crepuscularia*, 4; *E. lariciata; N. trepida*, 2; *L. camelina*, 1; *D. pudibunda*, 6; *D. coryli*, 1; *E. vulgata*, 1. June 7th.—Minimum during night 40°, windy; the trap was placed in a narrow wood-ride, to be protected from the wind:—*H. velleda*, 1; *L. camelina*, 1; *S. lubricipeda*, several; *S. menthastri*, several; *R. tenebrosa*, 1; *H. adusta*, 1; *C. bidentata*, 2; *N. pulveraria*, 1; *L. viridaria* (*pectinitaria*), 3 or 4; *E. lariciata*, 1; *E. vulgata; E. plumbeolata; M. montanata*, abundantly; *M. fluctuata*, 2; *C. truncata* (*russata*), 1. July 2nd.—Warm; at 11.30 p.m. the thermometer stood at 57°; W.N.W. wind; moon full, but well obscured by clouds:—*S. lubricipeda* and *S. menthastri*, as usual; *R. tenebrosa*, 1; *N. festiva*, 1; *P. moneta*, 1; *M. margaritaria*, 5; *G. papilionaria*, 1; *C. exanthemaria*, 1; *P. tersata*, 2; *T .amataria*, 1; *A. imitaria*, 1.—W. M. Christy; Watergate, Emsworth.

Fraudulent Colour-varieties.—I think that it is incumbent on me to utter a note of warning on this subject to collectors. We all know that occasionally "varieties" are manufactured and passed off upon the unwary as being genuine examples; and some time since an imposture of this sort was detected, and described in the 'Entomologist.' In that case, however, as also, I believe, in many others, the fraud was perpetrated by means of *painting*, and was, therefore, pretty easy of detection. Now, however, anyone who cares to take a hint from my experiments may manufacture the most excellent varieties, and without fear of detection. I would undertake to produce, myself, yellow varieties of normally red species, milk-white specimens of *P. phlæas*, "sea-bleached" varieties of the heath butterflies, and so on, that would, I think, *defy detection* as artificial, and would very safely be passed off as genuine varieties. Since, then, I feel that I have thus opened a door to the unscrupulous, it is only right that I should fairly warn the readers of the 'Entomologist' against the chances of such deception. I would strongly recommend collectors, therefore, to buy no varieties similar to those artificial ones that I have described in the tables on pages 248—251, &c., of the last volume, and neither even to accept them in exchange, unless from correspondents whose good faith is already known to them. If, after this warning, any enthusiastic variety-hunter is cheated by imitators of my experiments, I shall feel that I have washed my hands of responsibility.—F. H. Perry Coste; Ravensboe, Burnt Ash, Hill, S.E., January 9, 1891.

The Distinguishing Marks between Tæniocampa opima, T. populeti, and varieties of T. incerta.—Will any readers of the 'Entomologist' kindly inform me of the definite difference in the markings of the above insects? I have read Newman and Stainton closely on all three insects;

but I have caught insects which, I have been told by good entomologists, are varieties of *T. incerta* (*instabilis*), but which I have thought have been either *T. opima* or *T. populeti*. As the sallow season is coming on, if this weather ever changes, I should be obliged for any information on the subject through the 'Entomologist.'—Throwley; Lees Court, Faversham.

Gynandromorphic specimen of Trichiura cratægi.—This specimen (bred in August last) only differs from the one previously recorded (Entom. xxiii. 345) in having both pairs of wings perfectly developed. The line of division down the thorax and abdomen, between the pale grey of the male on the right hand, and the brownish grey of the female on the left, is very sharply defined.—R. M. Prideaux; 9, Vyvyan Terrace, Clifton, Bristol.

Aberration of Dianthœcia nana.—In August, 1889, I took, at Mullion in Cornwall, many *Dianthœcia* larvæ in the capsules of *Silene inflata*, and its var. *maritima*. In June and July, 1890, five perfect *D. nana* came out, in four of which the cream-white markings are entirely replaced by the buff; both the buff and smoky markings have an olive-green tinge, which was very noticeable on emergence. In the fifth, the change of colour is only partial. In all, the markings are otherwise typical.—W. S. Riding; Buckerell Lodge, Honiton.

Carabus nitens at Wimborne and Ringwood.—I have taken two of these beetles, both in the spring; one at Wimborne, near a pond; the other upon my lawn, whilst cutting the grass.—J. H. Fowler; Ringwood.

SOCIETIES.

Entomological Society of London.—*January* 21*st*, 1891.—The Fifty-eighth Annual Meeting; the Right Hon. Lord Walsingham, M.A., F.R.S., President, in the chair. An abstract of the Treasurer's accounts was read by Mr. Herbert Druce, one of the Auditors, and the Report of the Council was read by Mr. H. Goss. It appeared therefrom that the Society had lost during the year five Fellows by death and had elected twenty-seven new Fellows; that the volume of Transactions for the year extended to nearly 700 pages, and comprised twenty memoirs, contributed by seventeen authors and illustrated by twenty-one plates. It was then announced that the following gentlemen had been elected as Officers and Council for 1891:—President, Mr. Frederick DuCane Godman, M.A., F.R.S.; Treasurer, Mr. Robert M'Lachlan, F.R.S.; Secretaries, Mr. Herbert Goss, F.L.S., and the Rev. Canon Fowler, M.A., F.L.S.; Librarian, Mr. Ferdinand Grut, F.L.S.; and as others, Members of the Council, Prof. R. Meldola, F.R.S., Mr. Edward Saunders, F.L.S., Dr. David Sharp, F.R.S., Mr. Richard South, Mr. H. T. Stainton, F.R.S., Colonel Charles Swinhoe, F.L.S., Mr. George H. Verrall, and the Right Honble. Lord Walsingham, M.A., F.R.S. It was also announced that the new President had appointed Lord Walsingham, Prof. Meldola, and Dr. Sharp, Vice-Presidents for the session 1891—1892. Lord Walsingham, the retiring President, then delivered an Address. After alluding to some of the more important Entomological publications of the past year, and making special mention of those of Edwards and Scudder in America, of Romanoff in Russia, of the Oberthürs in France, and of Godman and Salvin in England, the President referred to Mr. Moore's courageous undertaking in commencing his 'Lepidoptera Indica,' on the lines adopted in his 'Lepidoptera of Ceylon.' Attention was then called to the unusual development during the past year of the study of those problems which have been the object of the researches of Darwin, Wallace, Weissmann, Meldola, Poulton, and others, and to the special and increasing literature of the subject. In this connection allusion was made to Mr. Tutt's 'Entomologist's Record and Journal of Variation,' to Mr. Poulton's valuable book 'On the meaning and use of the Colours of Animals,' and to the interesting and important papers and experiments of Mr. F. Merrifield on the subject of the variation in Lepidoptera caused by differences of temperature. After alluding to the International Zoological Congress held at Paris during the past year, and to the rules of nomenclature which had been once more reviewed and revised, the President concluded by referring to the losses by death during the year of several Fellows of the Society and other Entomologists, special mention being made of Mr. E. T. Atkinson, Mr. J. S. Baly, Mons. l'Abbé de Marseul, Mr. Owen Wilson, Mons. Lucien Buquet, Mons. Eugene Desmarest, Prof. Heinrich Frey, Dr. R. C. R. Jordan, Mr. W. S. Dallas, Dr. L. W. Schaufuss, Dr. Hermann Dewitz, Mons. Louis Reiche, and Herr Peter Maassen. A vote of thanks to the President for his services during the year and for his address was proposed by Dr. D. Sharp, F.R.S., seconded by Mr. M'Lachlan, F.R.S., and carried. Mr. M'Lachlan then proposed a vote of thanks to the other Officers of the Society, which was seconded by Mr. S. Stevens, and carried. Lord Walsingham, Mr. Goss, and Mr. Grut replied.—H. Goss, *Hon. Secretary.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—*Jan. 8th*, 1891.— W. H. Tugwell, Vice-President, in the chair. Messrs. H. Williams, of Hornsey; and T. J. Washford, of Dulwich, were elected members. Mr. R. Adkin exhibited *Boarmia repandata*, L., bred from ova obtained from a moth taken at Westerham. During hybernation the larvæ were divided into two equal lots, one kept on growing privet, the other on growing birch. Although each lot produced some few individuals varying from the majority, there was no marked difference between the bulk of the one lot and the other. Mr. Adkin also exhibited *Retinia buoliana*, Schiff., and *R. pinicolana*, Dbl., bred from larvæ collected in the neighbourhood of Poole, the New Forest, and Surrey. Those from Poole and the New Forest emerged between June 26th and July 27th, and were all *buoliana;* those from Surrey emerged between July 12th and August 3rd; from July 12th to 22nd, all *buoliana*; from July 25th to August 3rd, all *pinicolana*, with the exception of one *buoliana* bred on July 27th. Mr. Tugwell exhibited two series of *Miana strigilis*, St., and *M. fasciuncula*, Haw., and referred to the statement recently made by Mr. Tutt, that these two species were only forms of one, he having received specimens which were intermediate between the two from the Rev. W. F. Johnson, of Armagh. Mr. Tugwell said this statement had considerably surprised him, and he at some length pointed out what he considered were the differences between the two. He also referred to the published descriptions of the larvæ respectively made by Newman and Buckley. Mr. Fenn remarked that he did not think Newman's descriptions of the larvæ were very reliable, as that gentleman never adopted any system in describing them. He thought, also, that larvæ varied so much in their different states, that the descriptions of solitary larvæ were of very little value. Mr. South expressed an opinion that the two species were undoubtedly distinct, in which opinion Mr. Barrett concurred, pointing out what he considered good distinctions between the two, adding that the larvæ, which were internal feeders, were very difficult to obtain and rear, and would no doubt vary considerably, although he had never himself bred any of the *Mianæ.* Mr. Tutt said that he considered the points of difference alluded to were only superficial and unsatisfactory; the remarks made by him as to the two species being identical were based, not on an isolated specimen of the form received from Ireland, but on a long series of the form which was certainly intermediate between *strigilis* and *fasciuncula*; he would, however, at a future meeting, exhibit the specimens referred to. Mr. Tutt, on behalf of Mr. Reid, of Pitcaple, exhibited long series of *Agrotis simulans*; a fine series of *Triphæna comes*, Hb., varying from pale to very dark, some of the specimens being beautifully banded; very bright forms of *Melitæa aurinia*, Rott.; also dark examples of *Melanippe fluctuata*, L.; and some specimens of *Abraxas grossulariata*, L.; this species Mr. Tutt stated had been introduced by Mr. Reid in the vicinity of Pitcaple with some success, and had apparently developed sexual dimorphism, the males becoming darker and females paler every year. Mr. Manger showed a box of Coleoptera from Australia.—H. W. Barker, *Hon. Sec.*

Lancashire and Cheshire Entomological Society. — *January.* — The Annual Meeting of this Society was held in the class-room of the Free Library, William Brown Street, when the President, Mr. S. J. Capper, occupied the chair, and delivered an address. He remarked that, having been frequently asked the question why have a special society devoted solely to the study of insects, *viz.*, an "entomological society," in towns where there were biological societies and natural history societies, which, of course, included this study, it had occurred to him that an apology for the Society, even though it had now been in existence fourteen years, might not be altogether inopportune. Before replying, he expressed his warmest sympathy with all societies and individuals interested in natural history, and in this feeling he was sure they all reciprocated, whilst many of them were, in addition to their own, members of other similar associations. It was, however, the vast field of investigation embraced by such associations as those alluded to, that led to the formation of societies like their own, where the studies were more circumscribed. However inexplicably, there appeared something peculiar in insect life that attracted certain minds specially. Most of those thus attracted would probably be naturalists generally, but they would acknowledge that they had a special predilection in this direction. This led to the formation of a special society. It was most fortunate for the advancement of knowledge that men's minds were so constituted, and that they were enthusiaists in different directions and became specialists, otherwise the fields of research were so inexhaustible that little real permanent work would be achieved. It would be found, in societies with more pretentions, that the men who made the greatest discoveries and did much practical work were specialists in some department. Briefly, the necessity for a society like their own was that the study of insect-life was attractive very specially to certain persons, drawing them into deep sympathy with each other, and establishing a kind of bond of union—he might say a kind of freemasonry—between them. Accordingly they made the study of insects the object of their Society. They admitted the comprehensiveness of their pretentions, and when they meet together it was found that most members had a special interest in some particular group, and in this became specialists, as, for instance, they had lepidopterists, coleopterists, &c. Fortunately, from an experience extending over fourteen years, they still claimed very great enjoyment in associating together, and found, in the discussion of matters connected with insect life alone, full employment for the hour or two monthly at their disposal, which in other societies were devoted to more general natural history. With the exception of a few months in the summer seasons, they had met regularly once a month. At most of their meetings original papers or essays on entomology had been read and discussed. A list of these papers, numbering 134, was printed in their last annual report, and over fifty of these were considered of sufficient importance to merit publication in their periodicals and other literature. Any surplus income had been devoted to the purchase of books on entomology, and they were gradually acquiring a valuable library. They had from time to time made known, and would now through the public press repeat, their willingness to give all the information in their power to agriculturists and others who suffered from the attacks of injurious insects, pointing out the best means of avoiding or remedying the same. In several instances they had been able to give most valuable assistance. In the future he proposed that, in addition to a complete insect fauna of their two counties, they undertook the investigation as far as possible of the life-history of each individual, ascertaining whether it was beneficial or injurious, so as to encourage its preservation or extirpation. They should in this set a noble example to other entomological societies, and let them hope that the day was not far distant when they should have such associations in each county. He also proposed that they form typical collections of all orders of insects, which would be valuable as instruction for their younger members. One of their hon. members, Mr. James Fletcher, entomologist and botanist of the experimental farms, Canada, had kindly forwarded for their acceptance reports of their Proceedings, 1887, 1888, and 1889, together with other printed interesting entomological matter. In these reports were published most elaborate observations on injurious insects, similar to those of Miss Ormerod and Mr. Whitehead in their own country, with the best means of remedying injurious attacks. Depend upon it, the work of societies like their own would be more and more the study of economic entomology. It had only been within the last decade or so that the importance of this had been prominent. Now it was recognised all over the world. With the exception, however, of Miss Ormerod's excellent work in their own country, the importance of these investigations were almost confined to America, but were now acknowledged in Belgium, Germany, France, Russia, Australia, and other countries. Let them, then, undertake economic entomology, modestly confining their observations to their own counties; but, having as it were circumscribed their work, let them hope it might be the more efficiently performed, and that their example might be followed by entomologists in other counties or districts, until the whole of the country was systematically embraced. The officers elected for the year were:—Mr. S. J. Capper, President; the Rev. H. H. Higgins, Vice-President: and Mr. F. N. Pierce, Hon. Secretary.

THE ENTOMOLOGIST.

Vol. XXIV.] MARCH, 1891. [No. 334.

NOTE ON *AGROTIS SUBGOTHICA*, Haw.

By J. Jenner Weir, F.L.S., &c.

An insect is figured under the above name in Stephens's Ill. Br. Ent., Haust. II., 126, pl. xxii. f. 3 (1829), and again by Wood, Ind. Ent. 36, pl. ix. f. 149 (1839). Rennie very imperfectly describes it in his Cons. Butt. and Moths (1832), and says that it is "scarce; Norfolk, near London, and Devon." Doubleday's Syn. List Brit. Lep. (1850), p. 12, gives the name under the head of "Reputed British Noctuæ." Stainton, in his Man. Br. Butt. and Moths (1857), does not mention the name; nor does Newman advert to it in his Ill. Nat. Hist. Brit. Moths (1869), except as a variety of *A. tritici*. Lastly, the name does not appear in South's Syn. List Br. Lep. (1884).

So completely has the name of the insect been lost sight of that, during my intercourse with British entomologists for more than half a century, I cannot recollect that I ever heard it mentioned as having been taken in England.

Haworth's name of the species seems to have migrated to America, but whether the common species, known under that name there, is that figured by Stephens is doubtful. I find that my excellent friend Prof. Riley, in his 'First Annual Report on the Noxious, Beneficial, and other Insects of the State of Missouri' (1869), p. 82, gives a figure of the moth (fig. 29, *a*, *b*), and appends Haworth's description, and states that Dr. Fitch concludes that it is an American insect, the eggs or larvæ of which have been accidentally carried to England. Since this decision Haworth's name has been generally applied to the American species, which is said to be synonymous with Walker's *Feltia ducens*, Lep. Het. ix. p. 203, n. 1 (1856).

Prof. Riley, in the same Report adverted to above, pp. 82, 83, gives an account of another *Agrotis* as the *A. jaculifera*, of which he writes that it resembles the preceding species almost in every particular, pointing out certain differences; this latter species is figured in pl. i. fig. 11, he states, and it appears by the plate to be a smaller moth than *A. subgothica.*

Mr. Butler, in 'Transactions of the Entomological Society of London' (1889), p. 377, gives both species in his "Synonymic notes on the moths of the earlier genera of Noctuites" thus:—*Agrotis subgothica*, Haw. (*Feltia ducens*, Walk.), and *Agrotis jaculifera*, Guén.; stating the latter to be the *A. tricosa* of Lintner, and the *A. herilis*, Grt. to be a very slight variety of it, but that as its specific identity is unproved he has retained it as a distinct species in the collection. So far all seems very clear, at least to the extent that it is possible to judge from figures and descriptions of so difficult a group as *Agrotis* and its allies.

Through the liberality of the Smithsonian Institution, I have of late become possessed of the 'Bulletin of the United States National Museum,' No. 38 (1890), in which there is a most elaborate and truly valuable paper entitled, "A Contribution toward a Monograph of the Insects of the Lepidopterous family Noctuidæ of Temperate North America: Revision of the Genus *Agrotis*," by John B. Smith. In this work I find the insect, identified by Riley as *A. subgothica*, given as *Feltia jaculifera*, Gn., and the *Agrotis jaculifera* of Riley, in the Report quoted above, is given as *Feltia subgothica;* in other words, the names are reversed, and *Feltia herilis*, Grt., is treated of as a distinct species.

Mr. Tutt, in the 'Entomologist's Record,' p. 10, writes thus:—"As is well known to British lepidopterists, *subgothica*, Haw., is not a distinct species at all, but simply a synonym of *A. tritici*, Linn., or at most a variety of that species."

I am puzzled: to what insect was the name of *Agrotis subgothica* given by Haworth and figured by Stephens?

In the 'Bulletin' mentioned I find the following British species are also North American, viz.:—*Agrotis ypsilon*, Rott. (*suffusa*, S.V.); *Peridroma occulta*, Linn.; *P. saucia*, Hüb.; *Noctua baja*, Fab.; *N. c-nigrum*, Linn.; *N. plecta*, Linn.; and, of course, *N. fennica*, sometimes claimed as a British "casual or accidental visitor."

I have omitted to mention that Staudinger, in his 'Catalog der Lepidopteren des Europæischen Faunengebiets,' does not include the name of *Agrotis subgothica.*

Beckenham, Kent.

LIFE-HISTORY OF *PACHNOBIA LEUCOGRAPHA.*

By J. Arkle.

I am indebted to Dr. Chapman, of Hereford, for an acquaintance with the life-history of this rare, local, and interesting moth—so rare that it frequently figures amongst "the few unrepresented species" in the cabinets of the older entomologists. During the last two seasons, early in the month of April, I received eggs from Hereford, which is one of the few localities for the insect. What I considered to be a careful description of the egg got lost; but Dr. Chapman again comes to my aid, and, in kindly helping out these observations with his own remarks upon the egg, converts my loss into a material gain.

"The diameter," he observes, "is ·78 mm.; height ·69 mm.; not quite spherical, but rather flattened below and narrowing upwards; about 44 ribs, terminating upwards in a raised waved margin round micropylean area: ribs sharp, fluted by indications of cross ridges, which are obsolete. Colour orange-yellow, with brownish red markings crowded together into an apical blotch, and a marginal zone, with an intermediate subapical zone nearly free (a common pattern in *Noctua* eggs). The top patch of brown is very large, and the zone below more regular than in egg of *P. rubricosa* (which has 40 ribs). Newly laid:—colour pale greenish or greenish-yellow."

The eggs I kept in a glass tumbler, with the usual gauze covering, elastic band, and square of glass over the top. They hatched about the 7th of May. Upon the larvæ, fed throughout on chickweed, I made the following notes, which correspond to the different moults or changes of skin. The caterpillar is not of active habits. It is apparently averse to much climbing or travelling, and is very easily reared.

1st. — After hatching:—head light brown; 2nd, 3rd, and 4th segments dark green; remaining segments very pale green. In moving, the caterpillars "loop" like Geometers; if disturbed they immediately assume a Sphinx-like attitude, sitting up in the form of the letter S, and looking very much—in colour, shape, &c.—like a bit of chickweed stem. At the slightest touch they fall to the ground.

2nd.—Head pale green, suffused with brown. Body uniformly green, but paler underneath. Characteristics as in 1st stage. The larvæ were now changed into large flower-pots, three parts filled with light soil. A covering of net was substituted for the gauze, and retained, with a glass covering, until the emergence of the perfect insect.

3rd.—Head inclining to russet-colour. Dorsal area olive-green; under surface pale apple-green. Each segment on the back is divided by a silvery-white thread-like line. There is a thin medio-dorsal silvery-white line, and a similar line (subdorsal) along each side. Below each subdorsal line is a stripe of the same colour. The Geometer method of progression is now changed for that of the Noctua.

4th.—Head light pea-green. Dorsal area pea-green and mottled with white. Each segment is divided by a well-defined yellowish line. Under surface pea-green, but a shade darker than the dorsal area; legs and claspers same shade as the under surface. On the back of each segment are two oblique pea-green marks, which, in the next stage, meet like the arms of the letter V. In this stage, however, they are not joined, but show a disposition to converge on each anal division. There is an interrupted medio-dorsal white stripe. On each side is a well-defined silvery-white line, immediately bordering on which, above, is a line of dark green.

Last stage.—The caterpillar is uniformly apple-green, *viz.*, a shade darker than pea-green; all the segments above and below being beautifully mottled with deep yellow. The segments—especially the 5th, 6th, 7th, 9th, 10th, 11th, and 12th—are well divided by a line of this broom-yellow colour. Head yellowish-green. Legs, claspers, and under surface the same mottled green as above. The green oblique marks referred to in the preceding stage meet on the centre of the anal division of each segment in a V, each arm of the V being slightly curved outwards, and then inwards, before meeting. An interrupted, white, medio-dorsal line runs along the back of each segment, beginning with the 2nd and intersecting the angles of the V-shaped marks. The caterpillar is further ornamented by a supra-spiracular dark green line along each side, bordered below by a silvery-white line, especially distinct on the 2nd, 3rd, 4th, and 5th segments. In the last stages there are two or three short, dark, and scattered hairs emitted from the dorsal area of each segment.

Pupation begins about the 20th of June. My notes show that all my larvæ had disappeared in the soil by the second week in July. The moths appeared early in the following March: my diary for 1890 gives the time between the 6th and 22nd. In the Chester district, owing to the cold weather last spring, I did not find the sallows in bloom before the 15th, and even then only in sheltered places. Some allowance must therefore be made for the early emergence of the bred insect, as "it appears *with* the sallows, three or four days after they come out; the same temperature produces both" (Dr. Chapman).

It will be seen that *P. leucographa* remains in the pupal state about eight months. To keep pupæ for that length of time in a healthy condition is not a very easy matter, and it occurred to me that as close an imitation as possible of natural conditions would be most likely to lead to success. I placed the pots on a brick floor, out of doors, against the north aspect of a wall, and had the satisfaction of seeing evidence—in the germination of chickweed seeds, &c.—of a continued natural moisture so necessary under the circumstances. In February and March the glasses were occasionally taken off, the pots treated to a gentle shower of rain, exposed in the sunshine, and so on.

I can add little to Newman's graphic description of the moth. The fore wings are deep brickdust-red,—in fact, mahogany colour,—sparingly dusted with grey scales. The orbicular and reniform are clearly marked out in whitish grey, the orbicular being filled in with a darker shade of grey. The reniform is transversely lengthened, and is composed of two lobes clearly defined in whitish-grey, the upper lobe being filled in with the same darker grey as the orbicular, the lower one with dark brown, almost black. This lower lobe is almost concolorous with a dark transverse shade of the wing-colour, which, beginning on the costal margin, surrounds the discoidal spots, and widens out so as to include nearly the whole of the inner margin. There is a marginal dark brown band of the same shade as that in the lower reniform lobe; and two very indistinct lines of spots, darker than the ground colour, cross the wing, the first before the orbicular, the second beyond the reniform. The hind wings are light grey, a shade darker than those of *Tæniocampa miniosa;* in Newman's figures they appear almost identical. A smoky shade increases towards the outer margin, and terminates in a delicately marked mahogany-coloured line. The wing-rays are dark and smoke-coloured. These hind wings show a rosy, iridescent tint. All the wings have a glossy appearance, and the ample fringes are beautifully tinted with rose-colour.

The antennæ of the female are simple; those of the male are very slightly pectinated. "The palpi are short" (Newman). The thorax is densely clothed, and of the same colour as the fore wings. The body is of the same grey as the orbicular interior, and slightly tufted anally and on the sides with the rosy colour of the wing-fringes.

Chester, January 3, 1891.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. PERRY COSTE, F.C.S., F.L.S.

(Continued from p. 15.)

V.—THE CHEMICAL ASPECT. F. (*concluded*).

SPECIMENS of *A. caia*, *E. jacobææ* and *C. nupta*, were then subjected to strong HCl for one hour. They were instantly yellowed, of course. Washing restored a faint reddish tinge, which quickly disappeared. Finding them after one to two hours still acid to the tongue, I again washed, and with this result: *jacobææ* became red; *nupta* flesh colour; *caia* remaining still nearly yellow. But on examining them after three days, they were all of the *natural red:* after another four days they were still the same, and finally, at the end of another week, the red was still permanent. Here the observations were stopped.

Wings of *S. ocellatus* and *P. apollo* (which had already been once yellowed by HCl and had afterwards recovered their full natural colour) were treated just as the foregoing three species. The first washing restored the full red to *apollo*, and the pink *somewhat* to *ocellatus* (entirely removing the yellow anyhow). A week later *apollo* was found still of its full natural colour, *ocellatus* being a very faded slightly pink tint (the colouring matter probably having been nearly all removed by this time). The lapse of another week produced no difference, the restored natural colours being permanent.

Now these experiments had already clearly proved several points: firstly, that the reversion was not due to treatment with alcohol; and secondly, that the whole secret lay in *removing the acid*—in which fact alone there evidently lay the virtue of washing the wings; *so that the yellow was permanent only so long as the wing was actually acid.* Here was an entirely novel and unlooked-for phenomenon,—something quite different from any former experience with other insect colours; and I would draw the reader's special attention to this peculiarity, to which I must revert when seeking to explain these results. Thirdly, it is clearly proved, so far, that the yellow produced by nitric acid *is permanent* and immovable. The question then arose: Which is typical of acid behaviour generally, HCl or HNO_3? This could only be settled by further experiment. Fourthly, it was at present somewhat uncertain how far washing could be altogether dispensed with, and the same result obtained as a mere *time effect.*

Wings of *Z. filipendulæ* were treated with dilute sulphuric acid (about 45 per cent.) for (A.) one hour and (B.) two hours. A., on being washed, was restored to a very faded red, which was still permanent after seven days. B. was also restored in the same way; examined two hours or so later it was found fairly yellow, and acid to the tongue; further washing restored it to the *full red*, which was still permanent in seven days' time. A wing of *S. ocellatus* was treated as A., and washing restored a little pink (?), which was unaltered seven days later.

These fresh results clearly pointed to the necessity for further investigation, and I therefore determined on an extensive set of experiments, in order to thoroughly clear up this question. Wings of the following six species were selected, viz., *V. atalanta*, *Z. filipendulæ*, *E. jacobææ*, *Deiopeia bella*, *C. hera*, and *C. nupta*,

—and treated with some or all of the following acids:* Hydrochloric (HCl); Nitric (HNO_3); Sulphuric (H_2SO_4); Phosphoric (H_3PO_4) Hydrofluosilicic (H_2SiF_6); and Oxalic ($C_2H_2O_4$).

Each experiment was made in duplicate, in order to ascertain (A.), the effect of simple washing; (B.), the *time effect*, if any. I must explain, however, that finding the process of washing exceedingly tedious, owing to the large quantity of water required in order to remove every trace of the acid, I had modified the process to this extent, that, after a slight wash, I added a drop of ammonia to neutralise the residual acid, and again gave a slight wash; this constituted in every way a great improvement in the method.

The following experiments then were made (in duplicate):—

V. atalanta	HCl	HNO_3	H_2SO_4	H_2SiF_6	H_3PO_4	—
Z. filipendulæ	—	—	H_2SO_4	H_2SiF_6	—	$C_2H_2O_4$
E. jacobææ	HCl	HNO_3	—	H_2SiF_6	—	—
D. bella	HCl	—	—	H_2SiF_6	—	—
C. hera	HCl	HNO_3	H_2SO_4	H_2SiF_6	—	$C_2H_2O_4$
C. nupta	HCl	HNO_3	H_2SO_4	—	—	$C_2H_2O_4$

We will take first the A. batch. These were started on June 8th, treated with acid for one hour, and then washed and neutralised and again washed, as above described. The following are the results:—

V. atalanta. *Not the least reversion in any case.*

Z. filipendulæ.
E. jacobææ.
C. hera.
C. nupta.
} In each species the HNO_3 specimen *remained perfectly yellow. All the others reverted to red.*

These reverted specimens were allowed to stand until July 25th, when the red was found still permanent in all of them (as also in *Deiopeia bella* HCl and H_2SiF_6). Here, therefore, this part of the experiment terminated.

The following notes were made on the behaviour of these red wings:—

In *C. nupta* the reversion was the least thorough.

In *hera* and *jacobææ*, treated with HCl, the red when restored was not the exact natural red, but rather more cerise (or in *hera* mauve-cerise); and in the case of *hera* this cerise tint was *permanent.*

All these reds dissolved *a little*† (*nupta* least so), *but not in HNO_3 more than* in, *e.g.*, HCl.

The behaviour of *atalanta* red is altogether abnormal, and entirely different from that of all the others: in which circumstance we have another proof that its constitution is different from that of other reds. Its red *dissolved* in the acids (except apparently in H_2SiF_6) just as, *e.g.*, *urticæ* chestnut does; and in consequence of this it was, of course, *entirely impossible to restore* the red by washing and neutralising. The further consideration of this exceptional and interesting species I am purposely deferring until after we have considered the nature of the *chestnut* pigment, from which, and *not from yellow*, the *atalanta* red is, I think, certainly derived.

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* For strength of these see pp. 184, 185, of vol. xxiii.

† See Entom. xxiii. p. 372.

We will now return to the B. batch. These (the duplicates of A.) were started on June 1st. (except the *Deiopeia* wings, which were started a week later). After one hour's exposure, the acid was *simply poured off*, as completely as possible,—the wings *not being washed or neutralised at all*,—and the watch-glasses (to which the wings were gummed) were then inverted and left standing on gauze-covered box-lids; the object of this treatment was to ensure that, in the first place, the residual acid (which of course cannot be poured off) should have an opportunity of running off the wing instead of accumulating on it, as would be the case if the wing were left in the lowest position (*i.e.*, in the centre of a concave watch-glass); and, in the second place, to ensure the access of plenty of air, and, in fact, secure ventilation; for it appeared to be possible that air might *slowly* produce the same effect as washing does quickly.*

These wings were left alone for many weeks, or in some cases months, and the following are the entries made at intervals in my note-book, as to the progress of the experiments:—

June 8th (one week). *None* of these wings show the least reversion to red as yet.

June 22nd (3 weeks, except for *D. bella*, 2 weeks). The following show *no signs* of reversion to red:—

V. atalanta. HCl, HNO_3, H_2SO_4, H_2SiF_6 (= all).
C. hera. HCl, HNO_3, H_2SO_4, H_2SiF_6, $C_2H_2O_4$ (= all).
C. nupta. HCl, HNO_3, H_2SO_4, $C_2H_2O_4$ (= all).
Also *E. jacobææ.* HNO_3.
Z. filipendulæ. H_2SO_4.

The following have somewhat reverted to red:—

Deiopeia bella HCl (after 2 weeks, that is).

E. jacobææ. HCl (and H_2SiF_6: this had been originally the least completely yellowed).

The following have *entirely reverted to red*:—

Z. filipendulæ. HCl,† H_2SiF_6 (emphatically so).

August 3rd (9 weeks). The above-noted reversions are permanent (viz. *filipendulæ*, HCl † and H_2SiF_6).

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* This is what I mean by the "time effect,"—not the most happily chosen term, I admit.

† This is the entry in my note-book: but it must be a *lapsus pennæ* intended almost certainly for H_2SO_4.

The partial reversions of *Deiopeia* HCl, and *E. jacobææ*, HCl, have now become complete reversions to the natural red.

The partial reversion of *jacobææ* H_2SiF_6 is still only in the intermediate condition.

And in addition the following reversions have also occurred:—

Deiopeia bella. H_2SiF_6, pretty fairly red (pink).

C. nupta. HCl, almost fleshish.

C. hera HCl, *a* red (*i. e.*, not quite the natural red; *cp. supra*).

Here, owing to the pressure of other work, my observations were discontinued, and the experiments were left to themselves for several months. The following observations were made on November 5th:—

Z. filipendulæ. H_2SO_4, red.

E. jacobææ. H_2SiF_6, reversion to red never completed.

D. bella. H_2SiF_6, red (pink).

C. hera. HCl, deep red; H_2SiF_6 and $C_2H_2O_4$, fairly red. H_2SO_4, red not recovered; but the wing not so much yellow as transparent.

C. nupta. HCl and $C_2H_2O_4$, a tolerable red. H_2SO_4, reddish orange.

Finally, a last observation on Nov. 30th showed—

C. nupta. HCl, H_2SO_4, $C_2H_2O_4$: all fairly red, or at least deep flesh.

C. hera. $C_2H_2O_4$ and H_2SiF_6, also red.

As to the remaining experiments, I should say that two (of which it may be noticed that no record is given above), viz., *Z. filipendulæ*, H_3PO_4 and $C_2H_2O_4$, came to an early and untimely end; whilst the *atalanta* experiments, in which it was perfectly clear that no reversion ever could take place, were abandoned after a few weeks' standing. Were it not entirely superfluous and unnecessary as evidence for what I had already abundantly proved, there would be considerable interest and importance attaching to the fact that two of the nitric-acid specimens, viz., *hera* and *nupta*, which had been allowed to remain for over five months, were still *as yellow as a lemon*, although not the least acid could be detected in them by that most sensitive test of—the tongue.*

I may add that, complete as the evidence for reversion now seems to be, fresh data are accumulating; for now, in experimenting on the various red species that have been sent to me, I make a rule of ascertaining afterwards the reversion behaviour. It is, however,—at least for the present purpose,—hardly necessary to add anything to what is stated above.†

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* It is not uninteresting that in—at least some—cases where the red colour is restored, it could be seen that the other side of the wing, *viz.*, that gummed to the glass, *remained still yellow*.

† I was anxious to know whether or not it would be possible to restore the red of *Delias*. I therefore touched it with a drop of acid, and then *instantly* washed copiously with water: the result was a return of a faded washed-out red. Considering the rapid and easy solubility of the pigment here, this was certainly as much as could be expected.

It now only remains to sum up the facts arrived at above, and then to endeavour a satisfactory explanation of them. First of all, the facts are these;—Putting aside altogether for the present the anomalous case of *Vanessa atalanta*, all reds are instantly or rapidly changed to yellow by any tolerably strong acid. If the acid used be nitric acid, the yellow so produced is *permanent*, and by no possible means can the original red be restored. In the case of every other acid, however (even in several instances after a week's exposure to the acid), the red may be restored by copious washing with water; or, better still, by neutralisation with ammonia and a slight washing. The same effect may be brought about by a longer or shorter exposure (to the air), without any washing or neutralisation at all. The resuscitated reds are usually of the natural tint, but in one or two cases may be somewhat different; and this difference is sometimes permanent (*Callimorpha hera*, e.g.). These resuscitated reds may be again yellowed by acids, the red again restored, and, in fact, this process repeated several times. With the exception of HNO_3 specimens, the yellow colour produced is entirely *dependent upon the presence of acid;* and the efficacy of neutralisation, washing, or air-drying, consists simply in the rapid or slow removal of such acid; as soon as the acid is gone, the red is recovered.

Now for the explanation:—I will not trouble the reader with any prefatory generalities, but will state at once the explanation which I have provisionally adopted until either it be disproved or a better found. Let us denote the molecule of red pigment by X: when any acid (except nitric) is added, I assume that this forms with X a so-called *molecular* compound: for instance, if we add hydrochloric acid we obtain a *hydrochloride* of X*—$X.HCl_n$. Such molecular compounds are very common both in organic and inorganic chemistry, and are of various degrees of stability or instability. The most interesting examples, however (as bearing on our present purpose), are perhaps the various salts of the alkaloids,—as, for instance, quinine (hydro)sulphate and morphine hydrochloride; but still more emphatically interesting is the trihydrochloride of rosaniline, as will appear directly.

Now, since we do not know anything of the *ultimate* nature of anything, we of course cannot explain why the molecule should be red, and the X.HCl, &c., yellow; but we do find that this *is so*, and our ignorance equally disqualifies us for being in the least surprised that such should be the case.

Next for the resuscitation of red:—We must suppose (as I have already said) —what is certainly to all appearance very clear —that these compounds of X and an acid are highly unstable. Now it is one of the most familiar facts in chemistry that unstable compounds may be decomposed or resolved into their generators by (an excess of) *water*. This applies not only to molecular compounds, but even to true salts also. One or two instances may serve to render this clear to the non-chemical reader: for example, arsenious acid and hydrochloric acid form arsenious chloride, but this is subsequently decomposed again by water; and a *precipitate* of phosphate of alumina may be decomposed, by excessive washing with water, into free phosphoric acid and aluminic hydrate. But out and away the most interesting example for our purpose is that of the tri-hydrochloride of rosaniline above mentioned: this is a brown dye (the mono-hydrochloride is *magenta*), *and very unstable, being at once decomposed by water.*

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* Note carefully, *not* a chloride (X Cl) which would be produced by double decomposition (as, for instance, $XY + HCl = XCl + HY$), and would be, of course, far more stable. Real molecular compounds are necessarily comparatively unstable: one of the most familiar instances is that of water of crystallisation in a salt: the union of the salt and the water molecules is of the nature of a molecular compound.

After this, further justification for my explanation of the red-yellow phenomenon seems superfluous; but there remains to be explained the gradual restoration of red by air-drying. As to this, we can only suppose that the highly unstable molecules of $X.HCl_n$, &c., are also gradually decomposed by some such process as that of oxidation. I may perhaps, at some future time, be able to throw further light upon this interesting subject.

We have, in conclusion, but to dispose of the HNO_3 phenomenon. It may be thought, perhaps, that this exceptional phenomenon is a grave difficulty in the way of my explanation; but that were entirely an error. Nitric acid is an acid *per se;* and it is not in the least surprising that a reagent notoriously so powerful and destructive should have a far more potent and permanent effect than other acids. There can be very little doubt that nitric acid does not form a hydro-nitrate comparable with the compounds previously referred to, but exercises an action of an oxidative nature, resulting in a permanent alteration of the structure of the X molecule—forming a stable oxidation product.[*] This being so, it is obviously out of the question to expect any decomposition from treatment with water, even though we had Niagara at our command.[†]

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[*] Glycerine, under certain circumstances, will react with nitric acid to form glycerine nitrate ("nitro-glycerin"—dynamite); but under other conditions it is completely oxidised up to glyceric acid, &c.

[†] The explanation proposed as to the mode of action of the other acids on the red pigment might be stated in somewhat different terms, although leading practically to the same result. Suppose we start with the original *yellow* pigment: call *that* Y. Suppose the red pigment to be developed by the union of Y with another molecule of (— ?) = Z: then the red pigment will be represented by Y Z. Suppose the action of an acid—say hydrochloric—be to decompose this, thus:—

$$YZ + HCl = Y + Z.HCl.$$

Thus we get the original yellow pigment Y in evidence again. The action of water would be to decompose Z.HCl again, so liberating the molecule Z to re-combine with Y, thus re-forming the pigment Y Z. Since the equation by which we

And here I think we may conclude this very lengthy sub-section, and for the present take leave of the two most interesting and instructive colours that it has been my fate to meet with during the course of this investigation.*

(To be continued.)

ON THE OCCASIONAL ABUNDANCE OF CERTAIN SPECIES OF LEPIDOPTERA.

By Robert Adkin, F.E.S.

A theory founded upon such careful observations as are recorded by Mr. W. W. Smith, in his able article on the 'Abundance of Lepidoptera in New Zealand' (Entom. xxiii. 305), is of considerable value in elucidating this interesting problem, not only in its bearing upon such phenomena in that district, but equally so in other parts of the world. As this gentleman has kindly referred to, and commented upon, a paper on a similar subject for which I am responsible, an abstract of which appeared in this journal (Entom. xxiii. 177), I propose to offer a few further remarks on the matter.

The drift of Mr. Smith's argument appears to be directed towards showing that seasons productive of luxuriant vegetation are favourable to the abundant development of Lepidoptera. Thus he says, "Less snow fell in the higher Alps (New Zealand) during the winters of 1888 and 1889 than for the previous twelve years, while the meteorological records show a corresponding mildness of temperature, and a considerable diminution of north-west or snow-melting winds. The summers following, each have been dry and hot, and naturally adapted to the life-habits of Lepidoptera; *all species* I observed during the past season, from the earliest spring-appearing species to those which appeared in late autumn, *emerged in great numbers*, and were all beautifully-developed insects." (The italics are mine.) I may say at once that I fully agree with the foregoing; it has always been my opinion, and in this I believe I am by no means singular, that certain meteorological conditions are favourable to

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represent the reaction is entirely hypothetical, and no more or less hypothetical in the one case than in the other, it is entirely immaterial which explanation we adopt: the broad result is the same in either case, and my readers are perfectly welcome to follow their own inclinations as to whether they amuse themselves by adopting the equations given in the text, or the alternative offered here.

* It may be surmised that I have forgotten my promise to fight out to the bitter end my amicable controversy with Mr. Cockerell as to the genetic relations of white, yellow, and red. I may assure my readers, however, that I am—like Scott's hero—*haud immemor*. But the matter is deferred for the present, not merely because this sub-section is already so immoderately long, but also because there are involved in such a discussion various entomological arguments which can be more fitly introduced in Section VI., on the biological aspect.

the development of Lepidoptera in abundance, while others tend in an opposite direction. But this would apply, and as Mr. Smith tells us in this case did apply, to the great majority of species; whereas the particular point that I sought to follow up was the cause of the unusual abundance of one or two particular species in seasons when the great majority of species were scarce.

Whether cases of *sporadic* abundance, such as I have indicated, occur in New Zealand, I am not fully aware, but I gather from the writings of Messrs. W. W. Smith and G. V. Hudson that they are not altogether unknown; and I think we should not too hastily assume that migration can have no bearing upon them, or even upon the abundance or otherwise of Lepidoptera generally. Mr. Smith tells us that, "The main facts adduced to account for the occasional abundance of certain species in the British Islands will not fully apply to the same phenomena in New Zealand," because, as he explains, "the British Islands and New Zealand are both insular areas; but while the former is separated only by a few miles from the European Continent, the latter is situated at least one thousand miles from the Continent of Australia." And further, that "the migration theory, as explained by Mr. G. V. Hudson (Entom. xxiii. 133), can have no bearing on the question in New Zealand." I cannot admit that this greater distance would form an insurmountable obstacle to immigration; if it were so, it seems highly improbable that that essentially New World species, *Anosia plexippus*, would have reached Great Britain (Proc. South Lond. Entom. Soc., 1886, pp. 17, 42, 60); and, except for this greater sea-space, the relative position of the British Islands and New Zealand to their respective continental bases are singularly alike. As the former occupies the position of the western boundary of the Asio-European region, so the latter forms the eastern extremity of the Indo-Australian: the lepidopterous fauna of the British Islands is essentially that of its continental base, and that of New Zealand, so far as it has been investigated, appears to belong to the Indo-Australian region. That migrations of Lepidoptera from the continental portion of the European area to the British Islands do occur has already been shown, and is it not reasonable to suppose that a similar condition of things exists in regard to New Zealand?

It is not many years since the annual migration of birds to and from the British Islands was regarded by many as nothing more than a wild theory, but thanks to careful and persistent observation we now know it to be an established fact; in the course of these observations material has been gathered which points to the conclusion that the occasional migrations of Lepidoptera follow the routes taken by the birds in their annual movements. Should this ultimately prove to be so, a case of bird migration recently reported from Tasmania should be of value as indicating a probable direction in which lepidopterous migrations should be sought in the southern hemisphere.

In the 'Papers and Proceedings of the Royal Society of Tasmania for 1889' is a paper by Colonel W. V. Legge, R.A., dealing with the Australian curlew, which species, he tells us, migrates north through the Malay Archipelago, being there met with on passage in Borneo, New Guinea, the Philippines, and other islands, and that New Zealand seems to be its eastern limit.

It is on the limits of a great faunistic region that the species inhabiting that region are least likely to maintain a permanent footing; consequently it is there that we may most reasonably expect their abundance to be affected in the greatest degree by the influence of migration.

Lewisham, S.E., February 10, 1891.

LEPIDOPTERA FOUND IN BRITAIN AND AMERICA.

By Richard South.

In his 'Bibliographical Catalogue of the Described Transformations of North American Lepidoptera'† Mr. Henry Edwards gives copious references to the published descriptions of the early stages of 1069 species of Lepidoptera occurring in North America. Seventy-nine of the species enumerated are found in Britain, and as the majority of these are well known, a list of them may be of interest to entomologists of this country.

For present purposes it has been thought sufficient to give the first British and first American reference cited by Mr. Edwards in those instances where any stage in the early life-history of a species has been noted by authors in both countries. The second date is, in all cases, the American one. Where only one date is given in this list the name of the authority is added, and an asterisk is used to denote the American.

The nomenclature adopted by Mr. Edwards, when different to that used in this country, is placed in brackets.

RHOPALOCERA.

Papilio machaon, L. (var. *aliaska*, Scud.), 1884, W. H. Edwards.* *P. napi*, Esp., 1828, 1886. *P. rapæ*, L., 1828, 1869.

Vanessa antiopa, F., 1828, 1841. *V. (Pyrameis) atalanta*, L., 1828, 1862. *V. (Pyrameis) cardui*, L., 1828, 1854.

HETEROCERA.

Sphinges.

Deilephila livornica (N. A. form *lineata*), 1797, Abbot-Smith.*
Trochilium apiformis, L. (*apiforme*), 1828, Stephens.
Sesia (Ægeria) tipuliformis, L., 1828, 1839.

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† 'Bulletin of the United States National Museum.' No. 35.

BOMBYCES.

Sarothripus undulanus, Hübn. (*Sarrothripa reveyana*, S. V.), 1859, Stainton.

Zeuzera pyrina, L. (*æsculi*, L.), 1829, Stephens.

NOCTUÆ.

Arsilonche albovenosa, Götze (Grote), = *henrici*, Gr. 1877, Thaxter.*

Leucania extranea (*Heliophila unipuncta*, Haw.), 1860, J. Kirkpatrick.

Hydrœcia (*Apamea*) *nictitans*, Bork., 1859, Stainton.

Apamea immanis, Guen., 1884, T. J. Edge.* (? = *Hydrœcia petasitis*, Doubl.).

Dipterygia scabriuscula, L., 1829, Stephens.

Apamea gemina, Hübn. (*Hadena remissa*, Hübn.), 1882, Kirby.

Agrotis suffusa, Hübn. (*ypsilon*, Rott.), 1829, 1869. *A. saucia*, Hübn., 1859, 1869.

Noctua (*Agrotis*) *plecta*, L., 1829, Stephens. *N.* (*Agrotis*) *c-nigrum*, L., 1829, 1877. *N.* (*Agrotis*) *baia*, Fabr., 1829, Stephens.

Amphipyra (*Pyrophila*) *tragopogonis*, L., 1829, 1870.

Tæniocampa incerta, Hufn., 1859, 1856.

Euplexia lucipara, L., 1829, 1883.

Aplecta (*Agrotis*) *prasina*, Fab., 1859, Stainton. *A.* (*Agrotis*) *occulta*, Hübn., 1829, Stephens.

Hadena (*Mamestra*) *trifolii*, Rott., 1882, 1881.

Gonopteryx (*Scoliopteryx*) *libatrix*, L., 1829, 1881.

Anarta cordigera, Thnb., 1859, Stainton.

Heliothis armigera, Hübn., 1859, 1855.

GEOMETRÆ.

Eugonia autumnaria, Wernb. (*Ennomos alniaria*, Esp.), 1859, 1876. Packard quotes Goddell and Scudder *in litt.*

Metrocampa margaritaria, L., 1859, Stainton.

Numeria (*Anagoga*) *pulveraria*, L., 1869, 1876. Packard quotes Merryfield.

Tephrosia (*Cymatophora*) *crepuscularia*, Hübn,, 1859, 1878.

Melanippe (*Rheumaptera*) *fluctuata*, L., 1859, 1876. Packard quotes Newman. *M.* (*R.*) *unangulata*, 1859, 1876. Packard quotes Newman. *M.* (*R.*) *tristata*, L., 1859, 1876. Packard quotes Newman. *M.* (*R.*) *hastata*, L., 1829, 1885.

Coremia (*Ochyria*) *ferrugata*, L., 1859, 1876. Packard quotes Newman. *C.* (*O.*) *munitata*, Hübn., 1869, 1876. Packard quotes Newman. *C.* (*O.*) *designata*, Hübn., 1859, 1880.

Cidaria (*Petrophora*) *testata*, L., 1859, 1876. Packard quotes Newman. *C.* (*P.*) *prunata*, L., 1859, Stainton. *C.* (*P.*) *truncata*, Hübn., 1869, 1876. Packard quotes Newman.

Hypsipetes (*Hydriomena*) *sordidata*, Fabr., 1869, 1876. Packard quotes Newman.

Oporabia (*Epirrita*) *dilutata*, Bork., 1869, 1858.

Venusia (*Epirrita*) *cambricaria*, Curt., 1869, 1876. Packard quotes Newman.

Camptogramma (*Plemyria*) *fluviata*, 1858, 1876. Packard quotes Newman.

Larentia (*Glaucopteryx*) *cæsiata*, Lang, 1859, 1876. Packard quote Newman.
Eupithecia absynthiata, L., 1859, 1876, Packard quotes Crewe.

PYRALIDES.

Pyralis (*Asopia*) *farinalis*, L., 1859, 1841. *P.* (*A.*) *costalis*, Fab. 1870, T. Glover.*
Ephestia elutella, Hübn., 1859, Stainton.
Plodia (*Ephestia*) *interpunctella*, Hübn., 1859, Stainton.
Aphomia sociella, L. (*colonella*), L., 1868, Packard.*
Galleria mellonella, L. (*mellinella*, Fabr.), 1836, 1841.

TORTRICES.

Peronea (*Teras*) *hastiana*, L., 1859, Stainton. *P.* (*T.*) *permutana*, Dup., 1881, Coquillett.* *P.* (*T.*) *ferrugana*, Tr., 1859, Stainton.
Tortrix (*Cacæcia*) *rosana*, L., 1859, Stainton. *T.* (*Lophoderus*) *ministrana*, L., 1859, Stainton.
Dictyopteryx (*Tortrix*) *bergmanniana*, L., 1837, Westwood.
Œnectra pilleriana, Schiff., 1859, Stainton.
Chrosis (*Conchylis*) *rutilana*, Hübn., 1859, 1878.
Retinia sylvestrana, Curt., 1859, Stainton.
Bactra lanceolana, Hübn., 1859, Stainton.
Penthina capreana, Hübn., 1859, Stainton.
Hedya (*Tmetocera*) *ocellana*, Schiff., 1859, 1841.
Hypermecia (*Steganoptycha*) *angustana*, Hübn., 1859, Stainton.
Phoxopteryx (*Phoxopteris*) *lundana*, Fabr., 1859, Stainton.
Carpocapsa pomonella, L., 1837, 1819.

TINEÆ.

Tinea tapetzella, L., 1859, 1864. *T. pellionella*, L., 1859, 1841.
Tineola (*Tinea*) *biselliella*, Hml., 1859, Stainton, Clemens.*
Scardia (*Tinea*) *granella*, L., 1837, 1841.
Hyponomeuta evonymella, Chambers = (? *evonymella*, Scop. Sta.), 1872, Chambers.*
Plutella cruciferarum, Zell., 1856, Fitch* (as *C. brassicella*).
Depressaria heracliana, De Geer, 1859, 1869.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 33).

SINCE the publication of the last part, a number of valuable records have been received, as follows:—

(14.) Arthur J. Chitty. A MS. list of Coleoptera and Lepidoptera, taken at Hatton and other localities.

(15.) Charles W. Watts. A MS. list of Lepidoptera, from the district N.W. of London, taken from 1865 to 1884. The "garden at South Hampstead," mentioned, is in the King Henry's Road.

(16.) Hy. Rowland-Brown, Jr. A MS. list of Zygænidæ and Bombyces, observed in North Middlesex.

(17.) Geo. Wall. A MS. list of Lepidoptera taken at Harefield, 1880 to 1890.

A few additions should be made to the lists published. Mr. Francis C. Woodbridge writes that *Crabro interruptus*, DeG., occurs in his garden at Uxbridge. Mr. C. W. Watts adds *Argynnis euphrosyne*, L., "which was, and probably still is, common in the woods about Pinner and Ruislip;" and *Nisoniades tages*, L., "common at Ruislip, in meadows." He also remarks that *Epinephele hyperanthes* is abundant in the same localities as *A. euphrosyne*, "with a strong tendency to var. *arete*, though I never got one altogether spotless." Mr. Rowland-Brown adds *Thecla w-album*, Knoch, "a single specimen, taken in 1887 by Mr. Peers, on the lawn at Harrow Weald Rectory;" and Mr. Geo. Wall gives me notes of *Deilephila livornica*, Esp., Harefield, one in 1884; and *Chœrocampa celerio*, L., Harefield, Aug. 1886, one specimen given to him by J. Milton.

Some other interesting notes have been sent, which will be useful for a list of addenda and new localities, to be prepared perhaps at some future date; but in such a list various new localities for the very common species will not be inserted, as they are scarcely of sufficient importance to justify the amount of space they would occupy. It is no doubt desirable that every parish in the county should have its fauna and flora catalogued accurately and in detail, but special information of this kind is best published by the local societies, and obviously cannot appear in full in a journal like the 'Entomologist.'

LEPIDOPTERA.

Sesiidæ.

Trochilium apiforme, Clerck, Hammersmith Marshes (*Godwin*). *T. crabroniforme*, Lewin, Hammersmith Marshes, *olim* (*Godwin*).

Ægeria tipuliformis, Clerck, generally common in gardens (*Godwin*); Isleworth (*Meyers*); Bedford Park, one at thistle flowers, July, 1886 (*Ckll.*); South Hampstead, common (*Watts*); St. John's Wood, common in some gardens where there are currant bushes, imago on sallow leaves, and on the pavement in Abbey Road, once (*South*); Clapton (*Bacot*); Dalston (*Prout*). *Æ. asiliformis*, Rott., Hyde Park (*Godwin*). *Æ. myopiformis*, Bork., generally common in gardens (*Godwin*); Isleworth (*Meyers*); Bedford Park (*J. Gray*); and one on a willow tree, Aug. 3, 1885 (*Ckll.*); South Hampstead (*Watts*). *Æ. formiciformis*, Esp., Hammersmith Marshes, common (*Godwin*). ***Æ. culiciformis***, L., Isleworth (*Meyers*).

Zygænidæ.

Ino statices, L., Mill Hill, abundant on the common (*South*); Old Oak Common, sometimes (*Godwin*); Ruislip, June 10, 1883 (*Watts*); Harrow-Weald, L. & N. W. Railway bank, Pinner (*Rowland-Brown*); Harefield, common (*Wall*).

Zygæna trifolii, Auctt., Mill Hill, on railway bank (*South*); Ruislip, June 14, 1883 (*Watts*); Harefield, common (*Wall*). *Z. filipendulæ*, L., Mill Hill (*South*); Old Oak Common, in numbers (*Godwin*); Isleworth (*Meyers*); near Ealing (*Ckll.*); Ruislip (*Watts*); Harrow-Weald (*Rowland-Brown*); Harefield, very common (*Wall*).

Nycteolidæ.

Sarothripus undulanus, Hb., rare, Bishop's Wood (*Godwin*); Harefield, common (*Wall*); Mill Hill (*South*).

Earias chlorana, L., Hammersmith Marshes (*Godwin*).

Hylophila prasinana, L., Bishop's Wood, Hampstead, common (*Godwin*). *H. bicolorana*, Fues., rare, Hampstead (*Godwin*); Harefield, one specimen, bred from pupa found on a plant, 1887 (*Wall*).

Nolidæ.

Nola cucullatella, L., Mill Hill, larvæ very common, beaten out of hawthorn, sloe, &c. (*South*); generally common, especially larvæ (*Godwin*); South Hampstead (*Watts*); Harrow Weald (*Rowland-Brown*); Dalston, showing perhaps some melanic tendency (*Prout*). *N. strigula*, Schiff., near Uxbridge (*J. E. Benbow*, Entom. 1878, p. 21).

Lithosiidæ.

Nudaria mundana, L., Mill Hill, common in the garden, flying at night (*South*); Clutter House Lane (*Godwin*); Harefield, once taken (*Wall*). *N. senex*, Hb., Harefield, once taken (*Wall*).

Calligenia miniata, Forst., Bishop's Wood, Hampstead, common (*Godwin*).

Lithosia lurideola, Zinck., Mill Hill (*South*); Bishop's Wood, Hampstead (*Godwin*); Oxhey Lane (*Rowland-Brown*); Harefield, common (*Wall*). *L. complana*, L., Bishop's Wood, Hampstead (*Godwin*). *L. griseola*, var. *stramineola*, Dbl., two taken, 1887, at Harefield (*Wall*).

*Arctiidæ.**

Euchelia jacobææ, L., Mill Hill, two on the Common, 1876 (*South*); very common near Addison Road Station as recently as 1879 (*Godwin*); Isleworth, abundant (*Fenn* and *Ckll.*); Chiswick (*Miss E. Sharpe*); Bedford Park (*J. King* and *C. Rowland*); Pinner (*Watts*); Harefield, one taken, 1888 (*Wall*).

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* Including as subfamilies *Eucheliinæ* (*Euchelia* and allies) and *Arctiinæ* (*Arctia* and allies).

Euprepia caia, L., Mill Hill, common in the larva stage (*South*); generally common (*Godwin*); Isleworth (*Meyers*); Bedford Park (*Ckll.*); South Hampstead (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Harefield, common (*Wall*). *E. villica*, L., Mill Hill, common in the larva stage (*South*); Old Oak Common, exceedingly common, West End Lane, Dollis Hill (*Godwin*); Isleworth (*Meyers*); Oxhey Lane (*Rowland-Brown*).

Spilosoma fuliginosa, L., Mill Hill, one specimen, 1876 (*South*); larvæ only, rare, Old Oak Common (*Godwin*). *S. mendica*, Clerck., Old Oak Common (*Godwin*); Hampstead, 1882 (*Watts*); Harefield, one taken, 1889 (*Wall*). *S. lubricipeda*, Esp., Mill Hill, common, flying just before dusk (*South*); generally common (*Godwin*); Isleworth (*Meyers*); Bedford Park (*Ckll.*); South Hampstead, larvæ (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Dalston (*Prout*); Harefield, common (*Wall*). *S. menthastri*, Esp., Mill Hill, common, flying just before dusk (*South*); generally common (*Godwin*); Isleworth (*Fenn*); Bedford Park (*Ckll.*); South Hampstead, larvæ (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Dalston (*Prout*); Harefield (*Wall*).

Hepialidæ.

Hepialus humuli, L., generally common (*Godwin*); Bedford Park, abundant (*Ckll.*); South Hampstead, common, second brood, Aug., 1881 (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Tottenham (*Prout*); Harefield, usually common (*Wall*). *H. sylvanus*, L., Mill Hill (*South*); near W. Hampstead Station (*Godwin*); Hendon (*Watts*); Clapton (*Bacot*). *H. velleda*, Hb., Bishop's Wood (*Godwin*). *H. lupulinus*, L., Mill Hill (*South*); generally common (*Godwin*); Isleworth (*Fenn*); Bedford Park (*Miss E. Sharpe*); Hampstead and Hendon (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Dalston (*Prout*); Harefield, abundant (*Wall*). *H. hectus*, L., Bishop's Wood, common (*Godwin*); Harefield, common, (*Wall*).

Cossidæ.

Cossus cossus, L. = *C. ligniperda*, Fb., Mill Hill, larvæ and pupæ, from an old ash, imago at sugar (*South*); Isleworth (*Meyers*); Hampstead (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Tottenham (*Prout*); Harefield, two bred from larvæ, 1887 (*Wall*).

Zeuzera pyrina, L., Mill Hill (*South*); Bedford Park (*F. Fenn*, *Miss E. Sharpe*, and *Miss Gertrude Blogg*); South Hampstead, bred from larvæ in mountain ash (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Bloomsbury (*Brit. Mus.*).

Liparidæ.

Porthesia chrysorrhœa, L., Mill Hill (*South*); Isleworth (*Meyers*). *P. similis*, Fues., common generally (*Godwin*); Isleworth (*Meyers*); Bedford Park (*F. Fenn* and *C. Rowland*); Hampstead (*Watts*); Oxhey Lane (*Rowland-Brown*); Dalston (*Prout*); Harefield, common (*Wall*).

Leucoma salicis, L., common generally (*Godwin*); Bedford Park (*Miss E. Sharpe*); South Hampstead, larvæ on poplar (*Watts*); Clapton (*Bacot*); Dalston (*Prout*).

Ocneria dispar, L., near Uxbridge (*J. E. Benbow*, Entom. 1878, p. 21).

Psilura monacha, L., rare, Bishop's Wood, only larvæ (*Godwin*); Pinner Woods, 1881 and 1882 (*Watts*).

Dasychira pudibunda, L., Mill Hill (*South*); Bishop's Wood, moderately common (*Godwin*); Pinner Woods, and larvæ on Hampstead Heath (*Watts*); Harefield, one bred from larva, 1887 (*Wall*).

Orgyia antiqua, L., Mill Hill (*South*); generally common (*Godwin*); Bedford Park, a larva on *Salix*, 1886 (*L. M. Cockerell*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Dalston (*Prout*); Harefield (*Wall*); Isleworth, 1890 (*Ckll.*).

*Bombycidæ.**

Trichiura cratægi, L., Mill Hill, a few larvæ found each year on hawthorn and sloe (*South*); Pinner (*Rowland-Brown*).

Eriogaster lanestris, L., Mill Hill, many batches of larvæ found on sloe (*South*); Kingsbury (*Godwin*); Oxhey Lane (*Rowland-Brown*).

Clisiocampa neustria, L., Mill Hill (*South*); generally common (*Godwin*); larvæ common on *Cotoneaster* in garden, South Hampstead (*Watts*); Oxhey Lane (*Rowland-Brown*); Dalston (*Prout*); Harefield (*Wall*).

Bombyx rubi, L., Mill Hill, larvæ very abundant, 1875, a female at rest amongst grass, 1876 (*South*); Old Oak Common (*Godwin*). *B. quercus*, L., doubtfully quoted from Mill Hill (*South*). *B. trifolii*, Esp., Hampstead, one specimen (*Rowland-Brown*).

Odonestis potatoria, L., Mill Hill, very plentiful in larval stage (*South*); generally common (*Godwin*); Isleworth (*Meyers*); Hampstead (*Watts*); Oxhey Lane (*Rowland-Brown*); Harefield, occasionally taken (*Wall*).

Lasiocampa quercifolia, L., Mill Hill, a few bred from larvæ found on sloe (*South*); one pupa spun up on a willow tree near Addison Road Station, place now built on; scrub bushes of whitethorn, blackthorn, elm, and stumps of willows, pupa about six feet from ground (*Godwin*).

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* Including as subfamilies *Bombycinæ* (*Bombyx* and allies) and *Saturniinæ* (*Saturnia* and allies).

Saturnia pavonia, L., Isleworth (*Meyers*).

Drepanulidæ.

Drepana lacertinaria, L., Pinner Woods, Aug. 5, 1881 (*Watts*); Harefield, one taken, 1886 (*Wall*). *D. falcataria*, L., Chiswick, larva on birch (*Alfred Sich*). *D. biniaria*, Hufn., Mill Hill, one netted on the Common, 1875, and one bred from pupa found in spun leaf under an oak by the roadside, 1876 (*South*); Bishop's Wood, rare (*Godwin*); Hampstead (*Watts*). *D. cultraria*, Fb., Bishop's Wood, rare (*Godwin*); Hampstead, one larva (*Watts*).

Cilix glaucata, Scop., Mill Hill (*South*); fairly common (*Godwin*); Hampstead (*Watts*); Oxhey Lane (*Rowland-Brown*); Harefield, common (*Wall*).

Dicranuridæ.

Dicranura furcula, L., bred from larva, Hampstead Heath (*Watts*). *D. bifida*, Hb., Mill Hill, four bred from larvæ, 1875—6 (*South*); Harefield, once taken (*Wall*). *D. vinula*, L., common in the larval stage on willow, sallow, &c. (*South*); generally distributed (*Godwin*); Isleworth (*Fenn*); Bedford Park, larvæ on poplar (*Ckll.*); South Hampstead (*Watts*); Clapton (*Bacot*); Oxhey Lane (*Rowland-Brown*); Harefield (*Wall*).

Notodontidæ.

Pterostoma palpina, L., Oxhey Lane, at light (*Rowland-Brown*).

Lophopteryx camelina, L., Mill Hill (*South*); Hampstead (*Watts*); Harefield, one larva found, 1887 (*Wall*).

Notodonta dictæa, L., Mill Hill (*South*). *N. dictæoides*, Esp., Hampstead (*John Lea*, Entom. 1887, p. 275). *N. ziczac*, L., John Street, Bedford Row, London (*Meldola*, Entom. 1887, p. 235).

Pygæridæ.

Phalera bucephala, L., Mill Hill (*South*); Isleworth (*E. A. Ormerod*); Bedford Park, larva, and a wing in a web of *Epeira diademata* (*Ckll.*); larvæ abundant generally (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Harefield, taken occasionally (*Wall*).

Pygæra curtula, L., one specimen at Highgate (*Watts*).

Cymatophoridæ.

Cymatophora duplaris, L., Mill Hill, at sugar (*South*).

Asphalia diluta, Fb. Mill Hill, at sugar (*South*); Harefield, moderately common (*Wall*).

Thyatira derasa, L., Mill Hill, at sugar (*South*); Bedford Park (*C. Rowland*). *T. batis*, L., Mill Hill (*South*).

3, Fairfax Road, Bedford Park, Chiswick, W.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

The Entomological Season of 1890:—

Notes from Ringwood.—In my notes of December (Entom. xxiii. 331) I gave an account of Rhopalocera taken here during last season, and now append further notes upon the moths and larvæ. Sugar here, as elsewhere, has been almost a failure, still by other means I have taken a fair number of species, and, upon the whole, I consider moths have been plentiful, only the rare species rarer than usual. A favourite mode of netting with me is to post myself under a thick sallow or sloe growing in the hedges of lanes, and net any insect that hovers about; many Noctuæ and Geometræ may be taken this way. Some larvæ have been abundant here, especially species of the Lasiocampidæ; *Clisiocampa neustria* in thousands upon apple trees, bramble, &c.; on one tree I saw five batches feeding; *Lasiocampa quercus*, upon sloe; *L. callunæ*, upon heath; also *L. rubi*, of which I have about one hundred hybernating; *L. potatoria*, upon various grasses, and the imago very common; several times I have seen the females deposit ova upon the dead leaves of *Rubus fruticosus*, in clusters of four or five; other larvæ plentiful, which I will mention in due course. *Sphinx ligustri* (one); *Smerinthus tiliæ*, from sallow; *S. populi*, common; *S. ocellatus*, sallow; *Macroglossa stellatarum*, few seen at geraniums; *Trochilium bembeciformis* (one), larvæ in sallow stems; *Hemaris* (*Macroglossa*) *bombyliformis*, scarce; *H.* (*M.*) *fuciformis*, several, and many bred, some of the same set with the wings quite covered with rich brown scales; to obtain them in this way the imago must be killed almost immediately upon emergence, as at the least flight the wings become clear: *Sesia tipuliformis*, common in my garden; *Setina* (*Lithosia*) *mesomella*, in company with *Emydia cribrum* and *Pachycnemia hippocastanaria*, common upon certain heaths. *Lithosia complanula*, common on the wing between ten and twelve, p.m.; *Gnophria rubricollis*, rather scarce, pupæ from moss upon oaks, the cocoon of which resembles *S. mendica*, only smaller; *Euchelia jacobææ* and larvæ, common; *Nemeophila russula*, few; *Arctia caia* and larvæ abundant; *Spilosoma lubricipeda*, *S. menthastri* (common); *S. mendica*, female taken and sixty-seven pupæ obtained; males of *Orgyia antiqua* flying through the ridings in the forest; *Dasychira fascelina*, *D. pudibunda*, scarce; larva of *Ocneria monacha*, few; *Porthesia auriflua*, *Hepialus lupulinus*, scarce; larvæ of *Psyche villosella*, fairly common, and now hybernatinng upon the heaths; to obtain these curious case-makers I go to the collecting ground about March or April, and if there are fir trees scattered about, search the trunks from one to two feet from the ground—it is a favourite position they take before pupating; failing trees, I have collected many from the ends of twigs of *Ulex europæus*, and in this position they greatly resemble the dead shoots with which the furze is usually covered: *Cilix glaucata*, common; also *Saturnia carpini*; of this species I found two cocoons upon the tops of *Calluna vulgaris*, quite conspicuous; *Pæcilocampa populi* (one); *Pygæra pigra* and *Phalera bucephala*, common; *Cerura bifida*, at sallow; *Cymatophora fluctuosa*, scarce; larva of *Asphalia* *ridens*, about a dozen; *Diloba cæruleocephala*, larvæ very plentiful upon several shrubs; *Acronycta psi*, *Bryophila perla*, *Leucania pallens*, *L. conigera* (one of these has the hind wings golden); *L. lithargyrea*, *Caradrina morpheus*, *Grammesia trigrammica*, *Anchocelis lunosa;* at sallow bloom, *Tæniocampa gothica*, *T. cruda*, *T. stabilis*, and *T. instabilis;* *Cosmia trapezina*, larva common; *C. affinis*, *C. diffinis:* *Scoliopteryx libatrix*, common; *Amphipyra tragopogonis*, scarce; last February and March I searched the herbage in the lanes for larvæ and found plenty, from which I have bred fine series of *Triphæna ianthina*, *T. interjecta*, *T. comes* (*orbona*), *T. pronuba*, *Habryntis* (*Phlogophora*) *meticulosa*, and others; I fed them up in a large bell-glass out of doors, and upon several occasions the lot were subjected to severe frosts, still it did not affect them, as few died: *Agrotis pophyrea*, on heath; *A. puta*, *A. segetum*, *A. saucia*, *Noctua c-nigrum*, *N. plecta*, *Axylia putris*, *Cerigo cytherea*, *Hadena* (*Miana*) *strigilis*, and numerous vars.; *H.* (*M.*) *furuncula* (two), and *Eremobia ochroleuca;* larvæ of *Miselia oxyacanthæ*, abundant upon hawthorn and sloe—I could have taken thousands; several bred; I was interested in the curious cocoons they form—quite an earthen wall between two layers of silk: *Dianthœcia carpophaga* and larvæ, common; also *Hadena* (*Xylophasia*) *monoglypha*, *Mormo* (*Mania*) *maura*, *Nænia* (*M.*) *typica*, *Xylocampa areola*, and *Cucullia lychnitis*, *Anarta myrtilli* and larvæ, common; *Abrostola tripartita* (*urticæ*), bred from pupæ found; *Plusia chrysitis*, abundant; *P. iota*, *P. gamma*, scarce; *Prothymia* (*Phytometra*) *viridaria*, common; *Zanclognatha nemoralis*, *Z. tarsipennalis*, *Herminea* (*Pechypogon*) *barbalis*, *Hypena proboscidalis*, and *H. rostralis;* larvæ of *Halias prasinana* beaten from oak; *H. quercana* and pupæ, from oak in autumn. The Geometræ fairly represented, some species quite plentiful; *Urapteryx sambucata*, common; I saw a female deposit a large number of ova upon a grass stem underneath hawthorn, and several yards away from ivy; *Ellopia prosapiaria* (two), *Metrocampa margaritaria*, *Odontopera bidentata*, common; *Epione advenaria*, one male; *E. parallelaria*, local; *Bapta bimaculata*, *Macaria liturata*, common; *Eugonia erosaria*, *E. fuscantaria*, *Selenia bilunaria*, *Himera pennaria*, *Crocallis elinguaria*, larvæ common upon sloe; *Pericallia syringaria*, common; also larvæ upon honeysuckle; *Rumia luteolata*, *Abraxas grossulariata*, *Ligdia marginata*, *Hemerophila abruptaria*, and *Thamnonoma wavaria* (*Halia vauaria*), all plentiful; *Cheimatobia brumata*. *C. boreata*, *Hybernia defoliaria*, *H. aurantiaria*, bred; *H. leucophearia*, in great variety; the restless little *Odezia atrata* was to be seen in profusion; also *Venilia macularia*, *Fidonia* (*Bupalis*) *piniaria*, and *Ematurga atomaria*, common; *Cleora lichenaria*, *Tephrosia rhomboidaria*, *T. consonaria*, *T. crepuscularia*, and *Pseudoterpna pruinata*, common; *Acidalia emarginata*, *Timandra amataria*, *Biston hispidaria* (one), larvæ scarce; *Anaitis plagiata*, common; *Ortholitha* (*Eubolia*) *cervinata*, larvæ abundant upon mallow; *O.* (*E.*) *limitata*, *Anticlea badiata*, *Scotosia* (*Eucosmia*) *undulata* (two); *Larentia viridaria*, *Hypsipetes sordidata*, *Melanippe montanata*, *M. fluctuata*, *Melanthia ocellata*, *Thera firmata*, *Camptogramma bilineata*, all plentiful; *Zonosoma punctaria*, *Acidalia imitaria*, *Aspilatis strigillaria*, abundant; *Ortholitha* (*Eubolia*) *palumbaria*, *Oporabia dilutata*, scarce; *Eupithecia minutata*, *E. nanata*, *E. venosata*, *E. tenuiata*, *E. rectangulata*, and other pugs, common.

Botys ruralis and *B. urticata*, plentiful; also *Hydrocampa nymphæata*. *Nemophora swammerdamella*, scarce; *Adela Degeerella* and *A. viridella*, both extremely common in the forest. In the foregoing I have mentioned a lot of common species; perhaps my notes of next season may contain some of the rarer kinds that are to be found in this district. It is impossible to take all the different species in one season, and this being my first here, I am well satisfied with my captures.—J. Hy. Fowler; Poulner, Ringwood, January, 1891.

Notes from Plymouth. — This year (1890) larvæ have been far more abundant in this district than imagines, at least this is my experience. Natural attractions in the way of favourite flowers were unproductive until towards the end of the year, when some common species were abundant at ivy bloom. At sallow blossom scarcely anything was taken until the end of March, when *Tæniocampa stabilis*, *T. cruda*, and *T. rubricosa*, made their appearance, and were joined early in April by *T. gothica*, which was then more abundant, perhaps, than any of them. As early as the 13th of March, a specimen of *Selenia illunaria* came to light. From the end of February till towards the end of March, *Hybernia leucophearia* was very common in oak woods, accompanied during March by *H. progemmaria* and *Anisopteryx æscularia*. Out of a number of larvæ and pupæ of *Trochilium bembeciformis* obtained from a willow-bed in April, I only succeeded in rearing one specimen, the rest being attacked by mildew. *Coremia ferrugata* and *Melanippe subtristata* were a perfect pest during May, June, and the early part of July. *Tephrosia crepuscularia* and *T. consonaria*, Newman, were abundant in Bickleigh Vale at the end of May; *Fidonia atomaria* on heathy ground near by. Six larvæ of *Psilura monacha* fell to the beating-stick; this larva seems especially fond of the short weak shoots that so often encircle the trunks of oak trees. Two larvæ of *Pœcilocampa populi*, and three each of *Petasia cassinea* (*Asteroscopus sphinx*) and *Tethea subtusa* were taken about the beginning of June. *Thecla betulæ* larvæ were abundant in some localities not far from here. As before recorded (Entom. xxiii. 264), two specimens of *Heterogenea asella* were beaten on June 20th. I am nearly certain that a third specimen which was secured was the same species, but not knowing the rarity of the species it was discarded, as it had been rubbed in capturing. During July larvæ of *Dianthæcia capsincola* were very abundant, feeding on the seeds of *Lychnis dioica*; *D. carpophaga* and *D. cucubali* rarer on *Silene inflata*. This year I have come across both varieties of the larva of *Trichiura cratægi*. In former years we have found the variety of the larva with golden rings the commoner. This year only one of this variety was beaten, while I obtained a couple of the other. Has it been positively ascertained that these two most dissimilar larvæ are not separate species producing very similar imagines? There seems to be no more reason for classing them as varieties of one species, than for regarding the larvæ of *Acronycta tridens* and *A. psi* as belonging to one species, unless, indeed, the two varieties (?) of the larva of *T. cratægi* have been obtained from the same parent. I beat a larva of *Notodonta dodonea* or *N. chaonia* (am uncertain which until moth emerges) on 21st June, and on 2nd July found a full-fed larva of *Cymatophora ridens* drowned in a stream. This year I reared *Boarmia rhomboidaria* var. *perfumaria* from larvæ taken in the neighbourhood; I believe this variety to be new to the locality. Young *Demas coryli* larvæ were taken as early as Aug. 6th; they seem to be local, but not uncommon. I obtained fifteen young larvæ by beating, and failing to rear these, I again beat for them about the middle of September. These latter, eleven in number, were nearly all full-grown, and some had taken that beautiful pinkish-yellow tinge which these larvæ usually assume before pupation. I beat *Cleora glabraria* on 7th August, near Bickleigh Vale. Larvæ of *Notodonta dromedarius* were taken at various stages of growth, from Aug. 7th to Sept. 16th. Those taken on the former date were spinning up two days later; the one on the latter date was quite young. Last year I took a larva of this species on *hazel*. *Thecla betulæ* began to emerge on Aug. 10th. On Aug. 12th I beat a fine *Tethea retusa*, and the next day found a full-fed larva of *Notodonta dictæoides*, together with larvæ of *Drepana falcula* and *D. lacertinaria* on birch. *Zygæna filipendulæ* was plentiful on the 18th, in a locality near Plymouth, where we have once taken the variety in which the red colouring is entirely replaced by cream-colour, but we only noticed the type this year. On the 29th of August I took *Tapinostola fulva* in a meadow close here (Reading says it only occurs in two localities in the district, *viz.*, Exeter and Teignmouth). On the 3rd of September I took one larva each of *Thyatira batis* and *Gnophria quadra* (?). The latter died; I could not see that it ate any of the oak lichens with which I supplied it. *Aspilates citraria* was plentiful by Whitsand Bay, near Plymouth, on the 4th; and larvæ of *Bombyx rubi* swarmed. A fine larva of *Acronycta alni* was taken on the 6th, and the next day one of *Stauropus fagi* on quince, both in the immediate vicinity. I beat another *alni* larva on Sept. 11th, near Bickleigh Vale. The first *A. alni* prepared for pupation on Sept. 9th, the second on the 15th, *S. fagi* on the 29th. During the autumn, larvæ of *Notodonta camelina* have been abundant; those of *Hylophila prasinana* not uncommon. Some of the other insects taken this autumn are *Anchocelis rufina*, *A. pistacina*, *Oporina croceago*, *Miselia oxyacanthæ*, *Xylina petrificata* (one), *Xanthia silago*, *X. ferruginea* and *Orthosia lota;* while *O. macilenta*, *Cerastis spadicea*, *C. vaccinii*, and *Phlogophora meticulosa* swarmed at ivy. The latest record is two *Pœcilocampa populi* on Dec. 29th, one of them reared from larva, the other captured at light.—F. J. Briggs; Fursdon, Egg Buckland, December 31st, 1890.

Notes from the New Forest. — From the last week in February to the first week in June I found the past season a very favourable one, for the imagines of many species were much more abundant than usual, but the continuous rains after the latter date seem to have caused a great many disappointments in many parts of the country. The New Forest was certainly not an exception, the dearth of many common species being very marked. In July sugar was an absolute failure, and netting at dusk useless. *Argynnis paphia* and *Limenitis sibylla* were not in anything like their usual numbers, while the variety *valesina* was very infrequently encountered. Not one specimen of *Thecla quercus* was observed, although generally a plentiful species, and I failed to sight *Apatura iris* for the first time in five years. *Vanessa polychloros* had not emerged, but three pupæ were discovered. On the heaths *Selidosema ericetaria* (*plumaria*) and *Gnophos obscuraria* were taken sparingly, whilst *Satyrus semele* and *Lycæna ægon* were abundant. An expedition with Mr. H. Robson after *Emydia cribrum* was unsuccessful; either the insect was over, or we were not fortunate enough to strike the right locality. Two specimens of *Hyria auroraria* turned up, and the males of *Bombyx quercus* were frequently met with in their wild flight over the heath. It soon became evident that larvæ-beating was the best thing to be done. The oaks yielded *Dasychira pudibunda*, *Amphidasys strataria* (*prodromaria*), *Cidaria siderata*, *Odontopera bidentata*, *Notodonta trepida*, *N. dodonea* (*trimacula*); and from the sallows were obtained *Dicranura furcula*, *Pterostoma palpina*, and *Notodonta dromedarius*, but we found it useless to attempt birch-beating. A few larvæ of *Macroglossa fuciformis* were discovered, one of which could not have been hatched more than a few days, while another was about full-fed. Light attracted but few insects, the best thing perhaps being *Aventia flexula*. The extraordinary abundance of *Euchelia jacobææ* is worth recording; these larvæ were in thousands, and every plant of ragwort stripped, large quantities upon the herbage searching for food.—Alfred T. Mitchell; 5, Clayton Terrace, Gunnersbury, W., January 24, 1891.

Notes from Invernesshire.—Judging from various notes on the subject, the season of 1890 seems to have been a poor one for Lepidoptera throughout England. I spent August and twenty-four days in September at Beananach, about a mile from Carrbridge, Invernesshire. The neighbourhood was all that could be desired from an entomological point of view, and I was little prepared for the utter lack of Lepidoptera of all kinds, notably Diurni and Noctuæ. There were a good many Geometræ in the pine woods, but almost exclusively confined to the following species:—*Thera firmata*, *T. simulata*, *Cidaria populata*, and *Larentia cæsiata*. Treacling and light (moth-trap) were both failures. Mothing during the day was the sole productive employment.—D. H. S. Stewart; 66, Albert Hall Mansions, W., February 6, 1891.

Notes from Various Localities.—On May 15th my brothers and myself went to Wickham Wood, having been told by a friend that he had found there several larvæ of *Geometra papilionaria*. We searched the whole afternoon and were fortunate enough to get four full-grown larvæ of this insect, three of which attained the perfect state on June 11th, 13th, and 15th, respectively. The fourth turned out to be ichneumoned. On June 9th we visited the same locality, but the only larvæ worth mentioning which we could find were seven *Asphalia flavicornis* on the birches; we took, however, the following insects:—*E. dolobraria*, *B. consortaria*, *E. heparata*, *H. impluviata*, *C. propugnata*, *M. notata* (2). *T. obeliscata* (abundant), *M. montanata*, *V. maculata*, *M. rivata*, *P. petraria*, *A. remutata*, were all very common, while *E. punctulata* could be seen at rest on almost every tree. From August 2nd to Sept. 6th we were collecting at Sidmouth, in South Devon, and, as in the previous year, netted numbers of *Hesperia actæon*, *Pararge semele*, and *Argynnis paphia*; *A. adippe* and *A. aglaia* were both worn and scarce; *Leucophasia sinapis*, *Lycæna argiolus*, and *Nisoniades tages* were not, as usually, abundant. *Colias edusa* and *C. hyale* were nowhere to be seen (I should like very much to hear from any of your correspondents concerning the appearance of these insects last season). Sugaring during this month was ineffectual, but hedge-beating proved very productive. In this way we captured *C. spinula*, *E. apiciaria* (abundant), *H. elutata*, *U. sambucata*, *C. dotata*, *G. obscurata*, *C. elinguaria*, *A. subsericeata*, *P. cytisaria*, *H. thymiaria*, *C. testata*, *C. ribesiaria*, *E. affinitata*, *C. ferrugata*, *C. unidentata*, *C. pusaria*, *M. ocellata*, *M. galiata*, *C. immanata*, *S. illunaria*, *E. rectangulata*, *C. propugnata*, *C. picata*, *A. plagiata*, *A. promutata*, *M. furuncula*, *C. cubicularis*, *D. capsincola*. In the daytime *B. quercus*, *P. ænea*, and *T. interjecta* were common along the cliffs; and having found a female of the first-named, we were able thereby to procure as many males as we wanted. On one night, amid drizzling rain, we took on two lamp-posts close to the town *N. popularis* (15), *C. affinis*, *D. diffinis*, *N. plecta*, and *E. fuscantaria*. Among the larvæ which we found at Sidmouth were *Smerinthus populi*, *Sphinx ligustri*, *Dicranura vinula* (extremely abundant, but for the most part ichneumoned), *Brephos parthenias*, and *G. libatrix*. The sallows yielded a plentiful supply of *L. marginata*, *O. bidentata*, and *C. pusaria*. *Saturnia carpini* and *Bombyx rubi* were very prominent upon the brambles on the heaths, and while collecting a number of these we came across a few *Stilbia anomala*, which were, however, sadly battered. On our return home (Sept. 8th), we tried sugaring till the end of the month, but insects seemed scarce, the only exceptions being *M. maura*, *P. meticulosa*, *X. polyodon*, *M. brassicæ*, *T. pronuba*, and *C. nupta*. By light we captured *N. xanthographa*, *C. trapezina*, *E. lucipara* (1), *H. micacea* (3), *N. popularis*, *E. angularia*, *E. tiliaria* (on nearly every lamp), *T. subtusa* (one in a spider's web). Larvæ of *A. betularia*, *O. bidentata*, *M. persicariæ*, *M. oleracea*, *H. chenopodii*, *E. lucipara*, *H. triplasia*, *S. menthastri*, *S. lubricipeda*, and *A. aceris* were unusually abundant. We also found one *S. ocellatus* (on an apple tree), and one *D. bifida* (crawling down a poplar trunk)—C. M. WELLS; Hurstfield, The Avenue, Gipsy Hill, S.E.

MELANIPPE FLUCTUATA VAR. NEAPOLISATA, *Mill.*—In the account of the meeting (November 27th) of the South London Entomological and Natural History Society (Entom. 21), Mr. South is reported to have expressed a doubt as to the occurrence of *Melanippe fluctuata*, L., var. *neapolisata*, Millière, in Britain. In 1886, I sent a number of our dark-banded forms of *M. fluctuata* to Professor C. Blachier, of Geneva, and, as he thought them interesting, he forwarded a few to his friend the late Monsieur Pierre Millière, who at once identified them as exactly the same as his var. *neapolisata*, which he discovered a few years ago in and near Naples, and figured in his 'Iconographe,' vol. iii. pl. 131. In the 'Annales de la Société Entomologique de France,' 1887, Mons. P. Millière describes, and on pl. v. fig. 7 figures, a fine female example of our Aberdeenshire var. *neapolisata*, which was captured by me near Pitcaple in 1886; he at the same time expresses great surprise that a South European form should have been taken in such abundance in North Britain. As a number of specimens have now been found intermediate between the variety and type, several of my entomological friends have expressed a doubt whether the variety is worthy of a distinctive name; but this does not affect the fact that Millière's variety *neapolisata* is not only widely distributed, but common in many parts of Great Britain, especially towards the North of Scotland.—WM. REID; Pitcaple, N.B., January 5, 1891.

SUGAR.—Sugar in this locality, as in others this year, has proved disappointing; the only good thing that appeared during the summer was *Noctua stigmatica*, of which I took nine. From two females I obtained ova, and have now nearly fifty larvæ hybernating; these fed well on chickweed and plantain till the frost came. Though I laid on sugar some weeks nightly, I obtained nothing again of moment till the 3rd week in September; then, as the result of six nights' work, I succeeded in getting a short but very fine series of *Xanthia aurago*, graduating in colour from the deepest orange to pale yellow. The same week I obtained one *Xylina semibrunnea* and one *Epunda lutulenta*; then, with the exception of one wet Tuesday, when common things were plentiful, the season terminated abruptly.—J. CLARKE; Reading, December, 1890.

LEPIDOPTERA AT LIGHT AT HASTINGS.—From the end of August to the end of October I paid a good deal of attention to the lamps, particularly those on the outskirts of the town, with the result that I took about fifty species of Heterocera, and as I am about the only lepidopterist in Hastings, it may be worth while recording a few of the species taken. This season has been a particularly bad one for Lepidoptera here; many species which usually occur commonly at light, such as *Xanthia flavago*, *Cidaria miata*, &c., I have not seen at all this season, while many others which are generally common only occurred occasionally. The commonest species this season were *Luperina testacea*, *Neuronia popularis Diloba cæruleocephala*, *Melanippe fluctuata*, and *Pionea forficalis*. Among those which I found somewhat commonly I may mention *Bryophila perla*, *Hydrœcia micacea*, *Ennomos alniaria*, *Acidalia marginepunctata*, *Eupithecia oblongata*, *Anaitis plagiata*, *Crambus geniculellus*, *Platyptilia gonodactyla*, &c., while among those which only occurred occasionally or singly were *Lithosia lurideola*, *Hydrœcia nictitans*, *Gortyna ochracea*, *Orthosia lota*, *Anchocelis lunosa*, *Drepana binaria*, *Ennomos erosaria*, *Ephyra porata*, *Coremia ferrugata*, *Phibalapteryx vittata*, *Thera variata*, *Cidaria immanata*, *C. testata*, *Eubolia cervinata*, *Chesias spartiata*, *Cataclysta lemnata* (female), *Scoparia angustea*, *Homœosoma binævella*, *Conchylis straminiana*, *Xanthoselia zœgana*, &c. The weather has not been at all favourable for working the lamps, as the evenings have very frequently been cold or windy, so that I have had very few really good nights, otherwise the above list would doubtless have been considerably increased.—A. FORD; Alexandra Villa, Braybrooke Road, Hastings.

ABNORMAL PUPATION OF ACHERONTIA ATROPOS. — Last autumn I received two larvæ of the above species from Evenlode (Worcestershire), one of which was evidently about to pupate. The morning after arrival I found that the change had taken place, but the pupæ presented a curious spectacle. The larval skin seemed to have been shed successfully, but the wing-cases, instead of being drawn down in the usual way, were fully distended in a globular form and charged with the fluid which the upper part of the abdomen should have retained. It seemed probable that the surface of the pupa would harden in this form, but such was not the case, for but a short period had elapsed before a second inspection, when I found that the wing-cases had burst, discharging their contents. However, they were soon again fully charged and subsequently discharged. This process continued until all the liquid part of the pupa was ejected, leaving little but a shrunken skin. It should be mentioned that the larva had sustained no apparent external injury. Having bred a considerable number of imagines from the larval state without a similar occurrence, I thought this worth recording.—ALFRED T. MITCHELL; 5, Clayton Terrace, Gunnersbury, W., December 28, 1890.

PALE VARIATION OF LEPIDOPTERA. — Having seen many remarks lately about the dark varieties of Lepidoptera in the London district, I would draw attention to the occurrence of pale varieties also, which, although met with as frequently as the dark ones, do not seem to attract the amount of attention they deserve. The problem to be solved with regard to the cause of pale and dark varieties appears to be equally difficult in both cases. If we are curious to ascertain the causes of dark varieties, let us also hear the reason of the pale aberrations. — H. Sharp; 23, Union Street, Langham Place, London, W.

Pieris rapæ and Vanessa urticæ in February.—A small white butterfly was seen flying about some gardens at the north end of the town, on the 13th February, by my brothers, who gave chase, but did not succeed in capturing it. By the description given it would seem to be *Pieris rapæ*. The weather has been somewhat mild during the last week or two, but the night previous to the appearance of the insect was attended with a sharp frost; at about 11 a.m. the atmosphere became very cold, accompanied by rain and snow. While looking over my note-book I came across an entry of a white butterfly that appeared on the 11th Feb., 1890, in the same locality. A specimen of *V. urticæ* flitted about the aforesaid gardens on the 16th of the same month.—J. E. Knights; North Denes, Great Yarmouth. [One of Mr. McArthur's children saw a white butterfly flying in Fulham on the 12th of February last.—Ed.].

Nauseous Larvæ eaten by the Cuckoo.—Mr. Newstead's note in the January number of the 'Entomologist,' about the cuckoo, is specially interesting, as showing that it is an exception to the rule which the late Mr. Darwin considered to be established by Mr. Jenner Weir's experiments, that birds would not eat brightly coloured and nauseous larvæ. This propensity of the cuckoo probably accounts for the comparative scarcity of the larvæ of *A. grossulariata*, *D. cæruleocephala*, and *C. verbasci* in this neighbourhood, which has been frequently noticed, for we have an unusual quantity of cuckoos. It would be interesing to know whether the cuckoo will also feed upon the larva of *Mania typica*, the inedible exception of the protectively-coloured larvæ.—J. C. Moberly; Woodlands, Bassett, Southampton, Jan. 17.

SOCIETIES.

Entomological Society of London. — *February 4th*, 1891. Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. The President nominated the Rt. Hon. Lord Walsingham, M.A., F.R.S., Professor Raphael Meldola, F.R.S., and Dr. David Sharp, F.R.S., Vice-Presidents for the Session 1891—92. Dr. Thomas A. Chapman, M.D., of "Firbank," Hereford; Mr. Horace St. John Donisthorpe, of 37, Courtfield Gardens, S.W.; Mr. F. W. Frohawk, of 9, Dornton Road, Balham, S.E.; Mr. E. Ernest Green, of 10, Observatory Gardens, W.; Mr. G. F. Hampson, B.A., of Thurnham Court, Maidstone; Mr. Frederick J. Hanbury, F.L.S., of 69, Clapton Common, Upper Clapton, N.E.; and the Hon. Mary Cordelia E. Leigh, of Stoneleigh Abbey, Kenilworth, were elected Fellows of the Society. Mr. C. J. Gahan called attention to a larva which he had exhibited at the meeting of the Society on the 1st October last, when some doubt was expressed as to its affinities. He said that Prof. Riley and Dr. Packard had since suggested that the larva was that of a dipterous insect of the family *Blepharoceridæ*; he was quite of the same opinion, and thought it might probably be referred to *Hammatorrhina bella*, Löw, a species from Ceylon. Mr. Tutt exhibited a long series of *Agrotis pyrophila*, taken last year by Mr. Reid, near Pitcaple, in Aberdeenshire, and remarked that this species had been commoner than usual last year in Scotland, the Isle of Portland, and the Isle of Man. He also exhibited long and variable series of *Melitæa aurinia* (*artemis*), *Triphæna orbona*, *Abraxas grossulariata*, and *Melanippe fluctuata*, all from the same locality in Aberdeenshire. The Rev. Canon Fowler exhibited a cocoon of *Deiopeia pulchella*, recently received from Lower Burmah. Mr. C. O. Waterhouse exhibited specimens of *Scyphophorus interstitialis*, a Mexican species, and *Aceraius comptoni*, a Ceylonese species, recently taken by Mr. Bowring in his greenhouse. He also exhibited, on behalf of Miss Emily M. Sharpe, a specimen of *Daphnis hypothous*, Cramer, a native of Borneo, Java, and Ceylon, caught some years ago at Crieff, N.B. The specimen had long been confused with *Chærocampa nerii*, under which name its capture was recorded in the 'Entomologist,' xiii. p. 162 (1880). The Rev. Dr. Walker exhibited a collection including many species of Orthoptera and Scorpions recently received from Jerusalem. Mr. Frederick Enock read an interesting paper entitled "The Life-history of the Hessian Fly." This paper was illustrated, by means of the oxy-hydrogen lantern, with a number of photographs of original drawings showing the fly in all its stages and transformations. Mr. G. H. Verrall said he believed the Hessian Fly was no more a recent introduction into this country than the Cabbage White Butterflies. The discussion was continued by Mr. Godman, Mr. Enock, and others. Mr. Roland Trimen communicated a paper entitled "On some recent Additions to the List of South African Butterflies." Mr. H. W. Bates communicated a paper entitled "Additions to the Carabideous Fauna of Mexico, with remarks on species previously recorded." Mr. W. F. Kirby read a paper entitled "Notes on the genus *Xanthospilopteryx*, Wallgr. Dr. D. Sharp contributed a paper entitled "On the Rhynchophorous Coleoptera of Japan," Pt. 2.—H. Goss & W. W. Fowler, *Hon. Secretaries.*

Birmingham Entomological Society.—*December* 15*th*, 1890.—Mr. W. G. Blatch, President, in the chair. Mr. H. J. Sands Harborne was elected a member of the Society. Mr. R. C. Bradley showed *Emmelesia albulata*, type, from Knowle, and var. *thules* from the Shetlands. Mr. W. G. Blatch showed *Mycetophorus punctus* and *Conurus immaculatus* from Knowle, two beetles new to the Midlands. Mr. G. T. Baker read a paper on the Butterflies of Sunderland, giving a list of species to be obtained there, and exhibiting many of the most interesting.

January 5*th*, 1891.—Mr. W. G. Blatch, President, in the chair. Mr. P. W. Abbott showed *Noctua glareosa* and *Eubolia cervinaria* from Sutton Coldfield. Mr. R. C. Bradley showed *Sciara thomæ* from Cannock Chase. Mr. W. G. Blatch read a paper on the Coleoptera he had collected, during 1890, in the Church Stretton district; he showed ninety species, all of which were rare and interesting.

January 19*th*.—On this date the first annual Conversazione of the Society was held in the Library Hall at the Medical Institute. Over one hundred friends were present, and an instructive and pleasant evening was spent. Among the exhibits may be mentioned the following:—Collection of Midland Coleoptera in ten drawers, by Mr. W. G. Blatch; also Hemiptera-Heteroptera and Hymenoptera-Aculeata, by Mr. Blatch. Collection of British Butterflies, by the Rev. C. F. Thornewill; ten drawers of Hemiptera-Homoptera, by Dr. P. B. Mason; seven drawers of South American butterflies, by Mr. G. H. Kenrick; ten drawers of exotic butterflies, by Mr. G. T. Baker; fen Lepidoptera and others, by the Rev. E. J. Nurse; collection of Tipulidæ in seven boxes, by Mr. R. C. Bradley; and other exhibits by Messrs. G. W. Wynn, E. C. Tye, A. H. Martineau, P. W. Abbott, J. W. Neville, and C. J. Wainwright.

February 2nd.—Annual Meeting.—Mr. W. C. Blatch, President, in the chair. The Secretary read the Annual Report, which showed the Society to be in a satisfactory position. The Treasurer presented his Financial Statemont, showing a slight balance in hand. Votes of thanks were passed to the officers for their services during the past year, and the following were elected for the ensuing year:— President, Mr. W. C. Blatch; Vice-President, the Rev. C. F. Thornewill; Treasurer, Mr. R. C. Bradley; Secretary, Mr. Colbran J. Wainwright; Librarian, Mr. A. Johnson; Auditors, Mr. H. Stone and Mr. A. S. Wainwright. Messrs. P. W. Abbott and A. H. Martineau were elected as remaining members of the Council.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

[The Secretary will be glad to hear from any entomologists in the Midlands, not now members of the Society. The Society meets on the first and third Monday in each month, at 8 p.m., at the Medical Institute, Edmund Street, Birmingham.]

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —*January 22nd*, 1891. W. H. Tugwell, Vice-President, in the chair Mr. J. C. Dacie, of Putney, was elected a member. Mr. South exhibited specimens of what he thought to be a new species of *Miana*, the examples which had been until lately in his cabinet as *M. strigilis*, Clerck., were taken with others in North Devon. Mr. South read notes relative to his exhibit. Mr. Tugwell remarked that an examination of a larger number of specimens would be necessary before coming to any conclusion as to whether those now shown were a new species or only strongly divergent forms of *M. strigilis*. Mr. J. A. Clark, a variety of *Arctia caia*, L., in which almost all the white of the superior wings was replaced by brown colour. Mr. Short, specimens of *Polyommatus phlœas*, L., approaching the variety *schmidtii*, Gerh. Mr. Tugwell, *Hepialus velleda*, Hb., from Paisley, showing considerable variation in colour and size. It was mentioned that this species occurred at Darenth Wood and Folkestone, Kent; and at Sutton and Box Hill, Surrey. Mr. Tutt, specimens of *Miana* received from Ireland, which he contended were intermediate between *M. strigilis* and *M. fasciuncula*, and remarked that he and Mr. Atmore had that afternoon examined his series, consisting of one hundred and seventy of the one species and eighty of the other; and that they had been unable to find a single typical point of difference between the two, either in the stigma or the transverse lines; and as to the dorsal tufts. these were common to both species. In the discussion that followed, Messrs. South, Tugwell, Adkin, Fenn, Hall, and others took part. Mr, Billups exhibited *Sericomyia borealis*, Ten., and the rarer species *S. lappona*, L., *Chilosia æstracea*, L., *Arctophila nussitans*, F., *Eristalis utricarius*, L., and *Volucella bombylans*, L., with very dark varieties of the same, all taken in Aberdeenshire last season. A communication from the President was read by the Secretary. The Treasurer submitted his balance-sheet, showing a balance to the Society's credit of £71 17s. 9d. The Secretary read the Council's report for 1890, from which it appeared that 32 members had been elected during the year, making a total membership of 232. The election of officers was next proceeded with, and resulted as follows:—Mr. W. H. Tugwell, President; Mr. J. Jenner Weir, F.L.S., [illegible] Vice-President; Mr. E. Step, Hon. Treasurer; Mr. W. West, Hon. Curator; Mr. [illegible], Hon. Librarian; Mr. H. W. Barker and Mr. D. J. [illegible], Hon. Secretaries; Messrs. R. Adkin, F.E.S., T. R. Billups, F.E.S., C. A. [illegible], F.L.S., J. T. Carrington, F.L.S., C. Fenn, F.E.S., R. South, F.E.S., and J. W. Tutt, F.E.S., Council. The meeting closed with votes of thanks to the various officers.

February [illegible], [illegible] — W. H. Tugwell, President, in the chair. Mr. R. Adkin exhibited *Aplecta occulta*, L., bred during November and December last from ova received from Forres in the previous August. The specimens were all of a light form, the pink shade in the primaries being strongly produced in many of them. Mr. Tugwell said there was a darker shade of colour in the specimens shown than those obtained in the south. Mr. Tugwell exhibited *Melanippe hastata*, L., from Sussex and the Shetlands, to show the desirability of obtaining insects from various localities. Mr. [illegible], bred specimens of *Thecla pruni*, L., and called attention to a [illegible] specimen of the female which had emerged from the pupa without [illegible]. Mr. W. H. McLachlan, *Polia chi*, L., dark forms of *Noctua* [illegible], *Agrotis lucernea*, L., and *Epunda nigra*, Haw., [illegible] Aberdeen. Mr. Farrant, a richly coloured specimen of [illegible] and an example of *Epinephele hyperanthes*, L., [illegible]. Mr. Auld, a coloured drawing of a pale [illegible] L. Mr. Billups, *Trogus nova-cale*[illegible] [illegible] *Caledonica* [illegible] seemed to be exclusively [illegible] from the same [illegible] Don.; and re-[illegible] had a very wide [illegible], the Celebes, [illegible] above-mentioned places, had [illegible] a number of [illegible] Mr. [illegible] G. Barrett on [illegible]. — [illegible] W. Barker, [illegible]

[illegible] M.A., F.E.S.

[illegible] 1890.

[illegible] will be received by [illegible] interested

B

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THE ENTOMOLOGIST.

Vol. XXIV.] APRIL, 1891. [No. 335.

ON THE DISTRIBUTION IN EASTERN ASIA OF CERTAIN SPECIES OF LEPIDOPTERA OCCURRING IN BRITAIN.

By Richard South.

In drawing up the accompanying table of distribution I am indebted for much of my information to the following papers, and I would refer the reader to these if he desires further acquaintance with the subject:—

"On the Butterflies of Amurland, North China, and Japan." By H. J. Elwes (Proc. Zool. Soc. 1881).

"On Butterflies from Japan." By A. G. Butler (Proc. Zool. Soc. 1881).

"Catalogue of the Lepidoptera of Japan." By H. Pryer (Trans. Asiatic Soc. of Japan, vols. xi. xii.).

"On the Lepidoptera of Japan and Corea." By J. H. Leech (Proc. Zool. Soc. 1887, 1888, and 1889).

"A Catalogue of the Lepidoptera of Sikkim." By H. J. Elwes (Trans. Ent. Soc. 1888).

"On a Collection of Lepidoptera from Kiukiang." By J. H. Leech (Trans. Ent. Soc. 1889.)

Table showing the distribution in Eastern Asia of some British Species of Rhopalocera.

	Amur.	N.W. India.	China.	Corea.	Japan.
Papilionidæ					
Papilio machaon	+	+	+	+	+
Pieridæ					
Aporia cratægi	+		+		+
Pieris brassicæ	+	+			
,, rapæ	+		+	+	+
,, napi	+	+	+	+	+
,, daplidice		+	+	+	
Euchloë cardamines	+		+		
Leucophasia sinapis	+			+	+

	Amur.	N.W. India.	China.	Corea.	Japan.
Rhodocera rhamni	+	+	+	+	+
Colias hyale	+	+	+	+	+
Nymphalidæ					
Argynnis selene	+				
,, latona	+	+	+		
,, aglaia	+	+	+	+	+
,, adippe	+	+?	+	+	+
,, paphia	+		+	+	+
Melitæa aurinia	+			+	
,, athalia	+			+	+
Vanessa c-album	+	+	+	+	+
,, urticæ	+	+	+		+
,, io	+			+	+
,, antiopa	+	+	+		+
,, cardui	+	+	+	+	+
Limenitis sibylla	+			+	+
Apaturidæ					
Apatura iris	+		+		
Satyridæ					
Satyrus semele		+			
Epinephele hyperanthes	+			+	+?
Lycænidæ					
Thecla w-album	+		+		
,, pruni	+				
,, rubi	+				+?
Polyommatus phlœas	+		+	+	+
Lycæna bœtica		+	+		+
,, argiades	+		+	+	+
,, ægon	+			+	+
,, astrarche	+	+			
,, icarus	+?	+?			
,, argiolus	+		+	+	+
,, semiargus	+				
,, minima	+				
,, arion	+				
Hesperiidæ					
Syrichthus malvæ	+				
Nisoniades tages	+				
Hesperia lineola	+				
,, sylvanus	+		+	+	+
,, comma	+				+
Carterocephalus palæmon	+				

Papilio machaon, Linn.—Mr. Elwes says:—"The forms of *P. machaon* found in N.E. Asia seem to be similar to the European ones, though usually larger. In Kamtschatka, according to Ménétriés, the variety which he calls *asiatica* . . . . . differs generally in the broader black band and markings, which, however, vary extremely, and gradually increase until in the var. *hippocrates* (which I have only seen from China and Japan) the yellow is half obliterated by the black markings."

There are several broods in each year, the first batch of imagines appearing in March and April. From ova deposited by a typical female captured at Nagasaki, Japan, in the last-named month, Mr. Leech bred, in the following June, a fine series of vars. *asiatica* and *hippocrates*; "some specimens had the usual proportion of black and yellow, others were of a much deeper yellow than the ordinary type, and some were nearly all black, being by far the most pronounced var. *hippocrates* I have yet seen. Every specimen was much larger than the parent."

An almost tail-less form occurs in Kashmir.

Pieris brassicæ, Linn.—So far this species does not seem to have been received from either China or Japan. The Indian examples do not differ materially from European specimens, except that those taken at high elevations (11,000—17,000 ft.) are smaller.

Pieris rapæ, Linn.—Common in Japan, Corea, and N. China, where it is often abundant in market gardens and on other cultivated ground, as in England. A local form of this species, known as *crucivora*, has the fore wings of the female thickly sprinkled with grey-brown scales, especially at the base; in the male the second spot of the under side of the fore wing is reproduced more or less distinctly on the upper surface. This form has been considered as a local race of *P. brassicæ*, but Mr. Leech has shown that it is connected by intermediate forms with typical *P. rapæ*, which also occur in the same localities; and he adds:—"Mr. H. Pryer informs me that the larvæ, which feed on the cultivated Cruciferæ, do not differ from the typical forms, nor does the pupa."

Pieris napi, Linn.—Extremely variable: occurs all over Japan and Corea, and has been received by Mr. Leech from several localities in N.W. China. Although typical *napi* are by no means uncommon, most of the specimens from East Asia are of the form *melete*, Mén. Mr. Leech says of it:—"In Central and Northern Japan *napi* seems to be the spring form, and there are specimens in Mr. Fenton's collection in no way separable from British examples, and I have all the intermediate forms between *napi* and *melete* in my own collection. In Southern Japan the larger and darker forms predominate, and there is less difference between the broods." Besides other named forms of this species occurring in East Asia is one analogous to *bryoniæ* from Europe; this has been named *aglaope* by Motschler, who obtained specimens from Japan.

Rhodocera rhamni.—Various forms (?) of this species are found in East Asia, and these are referred to by Mr. Elwes as follows:—"The European form *R. rhamni* was found in the Burisja Mountains by Radde, and, according to Bremer, at Pekin. The form called *R. aspasia* occurs in various parts of the Amur region, and is usually known by its rather smaller size and paler colour, and, according to Ménétriés, may be certainly distinguished by the shape and venation of the wings, though I am unable to follow the distinctions he draws in the specimens before me. The Japanese form is like the one described by

Felder as *R. acuminata*, which he says differs in its larger size, brighter colour, more distinct discal spots, and in having the apex of the fore wing more produced. Chinese specimens, in Dr. Staudinger's collection, are more like *R. aspasia;* and Bremer states that a Chinese specimen he examined agrees with *R. rhamni;* so that the differences are evidently not constant. The Himalayan form, distinguished as *R. nipalensis*, is known by its bright colour, and by the wings having the marginal spots more conspicuous than usual in *R. rhamni*, which, however, it resembles more in colour and shape than it does *R. aspasia*."

R. maxima, Butl., is a large deeper-coloured insect from China.

Mr. Leech, in his remarks on *R. rhamni*, says:—"Occurs all over Japan and Corea. The *rhamni* (*maxima*) form occurs at low elevations in Central Japan. I only took *acuminata* on the mountains; from Gensan I have a specimen of true *rhamni*, and I have received from Ningpo two specimens which resemble *acuminata* in the shape of the wing, and *rhamni* var. *farinosa* in colour. There can be little doubt that these refer to one species, but I can form no opinion with any certainty until I receive larger series."

COLIAS HYALE. — Several forms of this species have been named and described as distinct. Concerning some of these so-called species, Mr. Leech gives his observations whilst at Nagahama:—"I found," he says, "the forms described as *poliographus*, *simoda*, *subaurata*, and *elwesii* all together; and of six pairs which I took *in copulâ*, and kept separately labelled, only two pairs were of the same form, viz., *simoda;* the remainder were as follows:—Two cases of *simoda* ♂ and *elwesii* ♀; one case of *subaurata* ♂ and *elwesii* ♀; one case of *simoda* ♂ and *poliographus* ♀. The inference is that they belong to the same species."

ARGYNNIS ADIPPE, Linn.—A very variable species. The forms known as *chlorodippe*, *cleodoxa*, and *cleodippe* occur, and three other varieties from Japan and China have been considered distinct, and named respectively *pallescens*, *vorax*, and *locuples*.

ARGYNNIS PAPHIA, Linn.—The Japanese form described as *paphiodes* by Mr. Butler is rather larger and darker than European *paphia*, but it cannot be considered specifically distinct. Mr. Leech says that female specimens from Japan and Corea are intermediate between typical *paphia* and var. *valesina*, and that the specimens from Kiukiang, China, are rather larger than those from Europe, the females being all of the *valesina* form; but some are darker than others. Both forms of the female occur at Chang-Yang, Central China.

MELITÆA AURINIA, Rott.—According to Mr. Leech, the Corean specimens are larger and paler than European examples. Mr. Elwes says that the species is rare in Amurland.

MELITÆA ATHALIA, Rott.—Mr. Elwes writes:—"The forms of *M. athalia*, found in Eastern Asia, are somewhat different from the European ones; but the Japanese *M. niphona* is like those from Askold. The variety *orientalis* from the Ussuri differs, in the female sex, in having whitish instead of yellowish spots beneath." The Corean specimens are stated, by Mr. Leech, to be usually paler than Japanese, but he adds:—"This species is so variable that it is impossible to form a correct opinion concerning it, without longer series than at present exist in this country."

VANESSA URTICÆ, Linn.—This species appears to be represented in Eastern Asia by certain local forms, some of which are more distinctly characterised than others. The Japanese *V. connexa*, Butl. (*vide* fig., Entom. xxii. pl. viii. fig. 3), is a very handsome form. Mr. Leech met with it about half-way up the volcano near Hakodate, and he is inclined to believe that it does not occur in any other part of Japan. The Kaschmir form is usually larger than the type, and the colour is duller in tone and more suffused. From N. W. China, Mr. Leech has a very large form, which is exceedingly bright in coloration, and the usual yellow spots on the costa of fore wing are suffused with tawny.

APATURA IRIS, Linn.—This species appears to be very common in some parts of China. In Thibet a brown form occurs, to which M. Oberthür has given the varietal name of *bieti*.

POLYOMMATUS PHLŒAS, Linn.—The late Mr. Henry Pryer, writing of this species, says that in Japan it is very susceptible to temperature, and is subject to great variation in the matter of size, colour, and markings. He adds:—"I have specimens measuring from 1 to 1½ inch. Some specimens are almost black, others are very light, and some have a row of blue spots on the hind wing. I have taken the dark forms in Boshiu, and the light ones about Yokohama, both in the month of November. As a general rule, with this and many other species, the hotter the weather the darker and larger the specimens; and Boshiu is decidedly warmer than Yokohama."

A dark form of the species known as *timeus*, Cram., is of common occurrence throughout Eastern Asia, and is very similar, if not exactly identical, with the form with which British entomologists are familiar as var. *eleus*, Fab. The other forms, some of which have been described as species, are also represented in Europe.

LYCÆNA BŒTICA, Linn.—A common species in many parts of India, China, and Japan. It varies in size and in depth of colour.

LYCÆNA ASTRARCHE.—Does not exhibit any material difference from European examples.

The Heterocera will be considered in a future paper.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. Perry Coste, F.C.S., F.L.S.

(Continued from p. 60.)

V.—The Chemical Aspect (*continued*).

G.

In this subsection we have to consider the case of chestnut, a colour sufficiently interesting,* but one which need not detain us for an unduly long time.

My readers are already familiar with the broad facts as to this colour, *viz.*, that it is a close analogue of yellow, and, like it, has been developed on or in, but *not from*, white wings, and also in one or two cases in wings of another "colour" than white; that it also, like yellow, belongs to the class of soluble, as distinguished from alterable, pigments; and that in exceptional cases it may also —as yellow so frequently does—develop *into a red*. Furthermore, we are able to distinguish with chestnut, as with yellow, progressive stages in stability (insolubility); and, as apparently a yet closer analogy, we find it possible that the chestnut pigment may advance to a very high stage of *brilliancy*, while yet remaining in the primeval stage as to solubility. This fact is exemplified by *V. urticæ*, and *Polyommatus phlœas* and *virgaurea*—instances that may, perhaps, be compared with *E. cardamines* among the yellows. And, in saying this, I should like to take the opportunity of clearing up a passage that I fear is reprehensibly ambiguous, and very liable to misinterpretation, in the foregoing subsection. In classifying the yellows (Entom. xxiv. p. 9), I divided them into three classes, according to their solubility or otherwise, and I placed *E. cardamines* in the first class, as possessing a very soluble pigment. So far, this is all right; but I fear that my subsequent remarks may very well be interpreted as implying that *E. cardamines* represented the *initial* stage of colouring—a stage beyond which the yellow species in classes 2 and 3 have considerably advanced. Now, seeing that *cardamines* is far more brilliantly coloured than many of the species in these two later classes, such a statement must seem very incongruous. But I ought to have more strongly emphasised the fact that while in so many yellow species an advance in depth of colour seems to go *pari passu* with a decreasing solubility,—this being the contention that my remarks in part of the last subsection were intended especially to enforce,—yet in certain instances, as in *cardamines*, a remarkable brilliancy of colour has been attained *without* any decrease in solubility.* But it should be noted, as of especial interest, that this *cardamines* colour is, as it were, developed in a collateral line, and *not* in the direct line of ascent to the *stable* oranges and yellows.† I merely note this now, since it will be necessary to recur to the subject.

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* And the more so since—to quote Wallace—"reddish or yellowish brown is, perhaps, the commonest colour among butterflies" ('Tropical Nature,' p. 190).

Furthermore, it is necessary for me to retract my remarks on *brown*, as being distinct from chestnut. It will be remembered that I designated as chestnut all those brownish species that proved amenable to my reagents, and separated off as a distinct class, under the name of brown, all those that were unaffected. But I have since concluded that this is hardly justifiable; at any rate, it is both illogical and inconsistent, so long as we recognise among the analogous yellows three stages, of which one is perfectly indifferent to all my reagents. Whatever mode of treatment we adopt in dealing with yellow, we must adopt the same with regard to chestnut; and, accordingly, I now propose to restore the eliminated brown species to the class of chestnuts, recognising in chestnut several different stages exactly as in yellow. And, in fact, so closely similar is the behaviour of chestnut to that of yellow, that a very large portion of the remarks made on yellow‡ are almost equally applicable, *mutatis mutandis*, to this colour. I shall, therefore, to avoid needless repetition, refer the reader back to subsection F for the bearing of the phenomena of chestnut on natural selection and coloric evolution.

The main headings, to which I wish to direct attention in this present subsection, are the following:—

1.—That in chestnut, as in yellow, there is reason to suppose that the pigment has been developed *on* an—usually white—wing; that this pigment was at first of a very soluble nature, but in process of time becomes increasingly stable. That we may thus distinguish several (say three) different stages or planes in chestnut also, and that in the highest (most stable), it is at present not possible to determine certainly whether we are dealing with a "physical," or with a very stable, pigment colour. And, finally, that in chestnut, also, a very marked advance in brilliancy of colour may take place without a concomitant increase in stability (*i. e.*, decrease in solubility). This latter, as already stated, I consider to be of the nature of a *collateral advance,* not a stage in the main-stream of coloric evolution.

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* An exactly parallel case is found in the *Delias* species, already referred to. See also following footnote.

† Since the preceding subsection (F)—on yellow and red—was written, I have been a good deal exercised in my mind about these species of *Euchloë*. At one time it appeared to me that I had been wrong in assuming that *cardamines* orange had been developed *viâ* pale yellow at all, and that rather it was a distinct and independent development altogether. This view would, of course, entirely evade the necessity of supposing that a yellow had progressed into so brilliant an orange, while still remaining so soluble; and I was inclined further to support this by arguing from the chestnut species, such as *L. phlœas*, &c. But further reflection and experiment have resulted in bringing me back to my original views. For, on examining the species *E. eupheno* (with its orange tips—identical with those of *cardamines*—on a brimstone-yellow background), I feel almost convinced that the orange here is a development from the yellow. Unfortunately, I have been unsuccessful in my attempts to obtain specimens for experiment; but, in the very analogous *Gonopteryx cleopatra*, I find that the orange is rapidly converted into the ground colour of yellow, and then the *whole yellow* dissolves, leaving a *whitish* wing. This is exactly analogous to *Delias*.

‡ *Antea*, pp. 11, 12, 13.

2.—That chestnut, as well as yellow, may evolve into a *red.*

On the other hand, several differences must be noted:—

1. That the concomitance of increased brilliancy, or depth of colour with increased stability (insolubility), is *by no means so clear* (if, indeed, it can be legitimately maintained at all) in chestnut as in yellow; and, on the other hand, the "collateral" brilliant, but soluble, colours appear far more common in chestnut than in yellow.

2.—That the advance to red, which is so common among yellows, is very rare among chestnuts; though *why* this should be so—considering, especially, how brilliant a colour has been evolved in the case of *atalanta*—is by no means clear.

Let us now arrange the various chestnut* species in three divisions, corresponding with those of yellow:—

3. Unaffected.	2. Intermediate; somewhat affected.	1 A. Brilliant; but soluble easily.	1. Soluble easily.
Orgyia antiqua	*Melitæa athalia*	*Vanessa io*	*Vanessa cardui*
Bombyx quercus	*Epinephele tithonus*	*V. antiopa*	*Argynnis paphia*
Orthosia macilenta	*Satyrus megæra*	*V. urticæ*	*A. selene*
Mamestra oleracea	*Athyma penus*	*Polyommatus phlœas*	*Cœnonympha pamphilus*
Cidaria suffumata	and perhaps		
Coremia ferrugata	*E. ianira*	*P. virgaurea*	*Hesperia sylvanus*
C. munitata			*Danais chrysippus*
Rumia cratægata			*D. hegesippus*
Phalera bucephala			
and perhaps			
Limenitis sibylla		†	†

Several interesting points are brought out by this tabulation. First of all, it is to be noted that, with one doubtful exception, *no Rhopalocera* are to be found in No. 3 column, and no *Heterocera* in the others. Whether this distinction will hold good when larger numbers of species come to be examined, it is, of course, as yet, impossible to say. And in this connection we must note, also, another point, *viz.*, that among the yellows several of the species placed in the "unaffected" column were known (by other reactions or by their relationships) to be certainly *pigmented* species; but, unfortunately, we have no such clue to the chestnut species in column 3, and, in fact, are entirely in the dark about them. It is unnecessary to add any details here about these "unaffected" chestnut species, since such have already been given.[*]

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* See Entom. xxiii. pp. 221 and 250.

† Note that alkalis seem considerably more efficacious, on the whole, than acids in dissolving chestnut. See Entom. xxiii., p. 250.

In the next place, this tabular arrangement emphasises the remark made, in a previous paragraph, that among the chestnuts increasing stability by no means connoted increased brilliancy, for the species in column 2 can scarcely be considered more brilliant or deep coloured than those in column 1.

The species noted in column 2 call for no individual remark, and we may, therefore, pass on to briefly consider those in column 1 A. The two species, *P. phlœas* and *P. virgaurea*, appear to me to be the most exact analogues of *E. cardamines*, since in both cases, alike, the pigment has acquired an intense brilliancy, and in both it is completely soluble, leaving a pure white wing; and just as this behaviour of *cardamines* may be compared with the reaction of the similarly soluble *pale* yellow of, *e.g.*, species of *Terias*, so, too, we may compare the behaviour of *P. phlœas* and *P. virgaurea* with that of the pale brown displayed by *Cœnonympha pamphilus*—a brown that is equally soluble, and equally leaves a pure white wing. The point which I wish to make in drawing this comparison is that, just as we may consider that a *pale* yellow developed into the brilliant orange of *cardamines*, without any loss of solubility, so also a pale soluble brown, such as that of *C. pamphilus*, was the precursor of the brilliant colour of *P. virgaurea*.

Turn we now to the species of *Vanessa*, which form a specially interesting and important group. First, as to *V. urticæ*: this is a very important species, as forming a (coloric) link between so many other species. The chestnut colour of *V. urticæ* is readily soluble, and can be seen oozing out and rising in dark vortices in the solvent.[†] Now exactly the same result is observed in *V. antiopa* and *io*. There can be no possible doubt that the same pigment is present in all these three species. But—and here we come to a very interesting point—whereas, in *urticæ*, a white is produced, in the other two species we find *black*. This puzzled me a good deal in the early days of my experiments, but the explanation, of course, is really very simple; indeed, it was the study of these species that first taught me that chestnut (and by inference, yellow[‡]) is not evolved *from*, but *on* or *in*, white; that its origin is, therefore, genetically independent of white. This obviously clears up the whole matter at once. The reason why the wings of *io* and *antiopa* "are transformed from chestnut to black" by my reagents, is simply that the ground colour of the wings is black, on which ground colour the chestnut has been evolved by the same processes which produced a similar chestnut on the whitish wing of *urticæ*.

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[*] Entom. xxiii. p. 221.

[†] I can recommend this as a singularly pretty experiment to any who are interested in observing such things.

[‡] I have, as yet, met with no yellow similarly evolved on a black wing; but I live in hope.

In another respect, also, I consider *urticæ* an important link, for the colour—in superficial appearance—is, as it were, intermediate between such dull colours as those of *S. megæra*, &c., on the one hand, and the brilliant copper of the Lycænidæ, on the other. Some hesitation might be felt in classing together such, apparently, very different colours as those of *P. virgaurea*, *S. megæra*, or *C. pamphilus;* but very little violence to our prejudices is done by classing together such colours as those of *virgaurea* and *urticæ;* and from *urticæ* we have coloric transitions, by easy stages, through *Argynnis*, *Melitæa*, and *Epinephele*, down to the palest and dullest of colours. Moreover, the contrast of *virgaurea* and *pamphilus* is no more than that of *cardamines* or *C. edusa* and *Abraxas grossulariata*, or the species of *Terias*.

The remaining species (column 1) call, I think, for no further remark at present. I will merely add that the species of *Danais* are so richly endowed with the chestnut pigment, that one hour is insufficient time for the total solution thereof.

Now, as to the evolution of red from chestnut. My readers are already pretty well aware of the grounds for holding that *atalanta* red has not been evolved—as almost *all* other reds—from yellow, but is descended from the chestnut of *cardui*. The proofs are, I think, very conclusive; indeed, we have a concursus of both entomological and chemical evidence.

The red does not—like all other reds—instantly turn yellow, but becomes of a "*cardui*-brown"; there is no reversion; but the pigment dissolves, just as does the chestnut of the other *Vanessa* species. Moreover, from the entomological side, *atalanta* and *cardui* are exceedingly closely allied—as the most cursory inspection will show; there is an intermediate Asiatic species, *V. indica*, marked like *atalanta*, *but with the scarlet band replaced by one of cardui-brown;* and, lastly, in *cardui* itself we find a delicate pink colour developed on the under surface. It seems to me, therefore, very clear that *atalanta*-red is a derivative of chestnut, and in this fact we have—as already pointed out—a very strong proof of the intimate relationship in constitution between the two pigments, chestnut and yellow. But why so conspicuous and presumably serviceable colour as red, which is so constantly developed by yellow species, has been so rarely developed by the far more numerous chestnuts, is a puzzling problem that I must confess myself totally unable to even conjecturally solve.* Something comparable with the reaction of *atalanta*-red is, perhaps, found in the behaviour of the reddish-marked species, *Hyria auroraria* and *Acidalia rubricata*.[*] It is exceedingly interesting that these belong to the Geometræ, among which, as I have already pointed out,[†] red seems to be so exceedingly rare.[‡]

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* One experiment with *atalanta* has not yet been recorded. I treated several wings with a strong solution of silver nitrate. The effect was to change the red of *atalanta* into a *very deep chocolate*. It was this that induced me to experiment on so many species—but unsuccessfully—with a (probably weaker) solution of this reagent. See Entom. xxiii. p. 185.

(To be continued.)

CONTRIBUTIONS TO THE ENTOMOLOGY OF THE PORTSMOUTH DISTRICT.

By W. T. Pearce.

RHOPALOCERA.

In my former paper (Entom. xxiii. 227), by some means I omitted *Gonopteryx rhamni*. The Pieridæ, therefore, should be credited with 9 species; and the total number of Rhopalocera for the district, 47 species.

Gonopteryx rhamni.—Common in woods north of Portsdown Hill; sparingly on Portsdown Hill. I have seen it on the ramparts at Gosport, and in the Stoke Road; it occurs sparingly in Alder Marsh; and is common at Grange and Rowner. On Portsea Island, Mr. H. Moncreaff tells me it occurs at Tipnor; and no doubt it occurs at Fareham, a district I have not yet worked.

The former possessor of my copy of Stainton's 'Manual' notes Shedfield, a village near Botley, as a locality for the following species:—*Colias edusa* and *C. hyale*, *Satyrus semele*, *Limenitis sibylla*, *Vanessa cardui*, *Argynnis paphia*, *Melitæa aurinia* (*artemis*), *Thecla betulæ*, *Lycæna ægon*, *Syrichthus malvæ* (*alveolus*), *Nisoniades tages*.

HETEROCERA.

SPHINGES.

In dealing with this group, I shall confine myself more closely to the district proper than I did with the butterflies. From an area of about 28 square miles, a large proportion of which is water, there are recorded no less than 18 species, including such rarities as *Deilephila livornica*, *Chærocampa celerio* and *C. nerii*. To these we must add 5 species, which occur within easy distance of Portsmouth; thus making a total of 23 species for the district, rather more than half of our British species.

Sphingidæ.

Acherontia atropos.—This species is to be found here in one or more stages nearly every year, and sometimes in numbers. In 1885 over 200 larvæ and pupæ were obtained by Mr. R. Stent and myself from the potato diggers at Portsmouth and Gosport. Several imagines were also taken.

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[*] See Entom. xxiii. p. 249. I find it noted in my records of experiments that on washing this species (*rubricata*) a "faintest possible pinkish tinge" was restored.

[†] See *antea*, p. 38.

[‡] Quite recently I have found another species, viz., *Anartia amalthea*, which is marked with scarlet, identical in its behaviour with the scarlet of *atalanta*. The red of *Heliconius amaryllis* is intermediate between the two classes of red.

Sphinx convolvuli.—Occurs throughout the district, but is rarely found in any great numbers. In 1885 it appeared rather freely, and several specimens, captured at Portsmouth, came under my notice. In one case a neighbour sent for me, as there was something she was very much afraid of on her door-mat. I was not at home, but my sister went, and secured a slightly worn female of this species.

S. ligustri.—Common throughout the district. On one occasion I secured 16 full-fed larvæ at Cosham.

Deilephila livornica.—One at jasmine blossom, by Mr. T. H. Larcom, in his garden at Gosport, July 18th, 1884. This specimen was recorded as *D. lineata* by myself (Entom. xvii. 234), and is now in the collection of the Rev. A. C. Sladen, of Newbury, Berks.

Chœrocampa nerii.—In August, 1885, at Portchester, a milkman, named Gates, whilst going his rounds, found a larva of this species on the periwinkle (*Vinca* sp.). He picked the stem on which it was resting, and, after carrying it some distance in his button-hole, gave it to a beginner, named Russell, who was successful in rearing the imago. Messrs. Moore and King, to whom I am indebted for this information, say the specimen is a very fine one.

C. celerio.—Three specimens at Gosport: one taken by Mr. Larcom in his garden, September 15th, 1879, recorded, Entom. xv. 190, and now, I believe, in the collection of the former editor of the 'Entomologist,' Mr. Carrington; one, found in the Royal Academy, is in the collection of Mr. Spriggs; and Mr. Lacey has one which was found by Mr. Loney on his vine in Stoke Road. Some years ago, Mr. Moncreaff found a larva of this species near a vine at Southsea, but was not successful in rearing it.

C. porcellus.—Fairly common at Gosport and in Portsea Island. Is probably to be found throughout the district.

C. elpenor.—Gosport. Not common.

Smerinthus ocellatus.—Fairly common at Gosport (Mr. Larcom took 14 larvæ in one season) and in Portsea Island.

S. populi.—Probably the commonest *Sphinx* in the district. It is very numerous some seasons on the street-lamps; at Gosport I have seen as many as three on one lamp.

S. tiliæ.—Scarce: 1 larva at Fareham in 1887 (*Mr. W. King*); 7 larvæ at Portsmouth, 1889 (*Mr. Jones and Mr. Careless*). About ten years ago I was told of a capture on a street-lamp at Gosport; but neither Mr. Larcom nor myself have met with the species.

Macroglossa stellatarum.—Common at the flowers of the viper's-bugloss on Portsdown Hill; Cumberland Fort, Portsea Island. Mr. Stent captured a specimen indoors at Portsea, it having probably been attracted by bright-coloured wall-paper. I once found a specimen sunning itself on a gate at Gosport; but Mr. Larcom and myself have not found it very numerous here.

M. fuciformis.—Not common. Stakes Wood; Purbrook Common; Grange.

M. bombyliformis.—Two, Stakes Wood, Mr. Larcom, 1886.

SESIIDÆ.

Sesia tipuliformis.—Common among currant bushes.

S. asiliformis.—One, Scratch-face Lane, 1888 (W. T. P.).

S. myopiformis.—"Used to be common at Copnor," Portsea Island (Mr. J. J. Moore).

S. culiciformis.—One, by a beginner, in Stakes Wood, 1887; now in my collection.

S. ichneumoniformis.—Portsdown Hill. Not common.

S. chrysidiformis.—Bred from roots of dock at Southsea, 1885 (Mr. H. Moncreaff).

ZYGÆNIDÆ.

Ino statices.—Some years common in a meadow at Purbrook.

Zygæna trifolii.—In the same locality as *I. statices*, and, like it, rather uncertain in its appearance, but is usually the commoner of the two. It also occurs near Denmead (Mr. King). Var. *confluens.*—Occasionally at Purbrook.

Z. filipendulæ.—Common. Portsdown Hill; Cosham; Eastney; Browndown.

101, Mayfield Road, Seafield, Gosport, March 12, 1891.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 69).

THE following sources of information are additional to those already given:—

(18.) F. C. Pratt. A MS. list of Coleoptera, taken mostly in South Kensington.

(19.) R. South. A MS. list of Middlesex Pterophoridæ.

(20.) Alfred Sich. A MS. list of Lepidoptera, taken at Chiswick.

(21.) A. H. Shepherd. A MS. list of Lepidoptera, taken in the N. and N.W. districts of London, 1865 to 1890.

(22.) F. A. Walker. A list of the insects of Hampstead, in 'Hampstead Hill,' by J. Logan Lobley, 1889.

LEPIDOPTERA.

Pterophoridæ.

This family, as here constituted, includes as subfamilies *Chrysocoridinæ* (*Chrysocorys*), *Pterophorinæ* (*Pterophorus* and allies), and *Alucitinæ* (*Alucita* = *Orneodes*). The nomenclature of the group has been much altered of late, but I have preferred to follow the older arrangement in the present paper, not feeling competent to decide how far the proposed changes should be adopted. Most of what is known about the plume-moths of Middlesex is from the investigations of Mr. South.

Cnœmidophorus rhododactylus, Fb., "not uncommon between 1874 and 1878 at several places near Mill Hill Station. I have not met with the species lately in that locality. A specimen was once taken on a gas lamp at Finchley Station, G.N.R., by Mr. E G. Meek" (*South*). See also Entom. 1878, p. 253.

Platyptilia gonodactyla, Schiff., Dalston (*Prout*); Mill Hill, Harrow (*South*). *P. bertrami*, Rössl., near Mill Hill Station (*South*). See also Entom. 1885, p. 97.

Amblyptilia acanthodactyla, Hb., Chiswick, two larvæ on wild geranium (*Alfred Sich*).

Mimæseoptilus bipunctidactylus, Haw., often common at Mill Hill; occurs among the herbage in the hedgerows bordering meadows (*South*). *M. pterodactylus*, L., between Pinner and Rickmansworth (*South*).

Œdematophorus lithodactylus, Tr., Isleworth (*Miss A. S. Fenn*, fide *F. G. Fenn*); Bedford Park, on the railway-bank (*Ckll.*). This species must be rare or absent in the northern part of the county, as Mr. South remarks that he has not met with it.

Pterophorus monodactylus, L., Hampstead, Kingsbury, Harrow, Mill Hill, very common (*South*).

Aciptilia pentadactyla, L., in the same localities as *P. monodactylus* (*South*); Bedford Park (*Fenn*); Isleworth (*Fenn*); Dalston (*Prout*); Finchley (*Shepherd*); Harefield, common (*Wall*). In Entom. 1883, p. 27, Mr. South mentions only *Calystegia sepium* as the food-plant of this species. At Beckenham, in Kent, I used to find the larvæ abundantly on *Convolvulus arvensis*, which is perhaps the more usual food-plant in the London district.

Alucita hexadactyla, L., Harefield, common (*Wall*); Mill Hill (*South*); Tufnell Park (*Shepherd*). Mr. South writes (*in litt.*, Feb., 1891):—"*Aciptilia galactodactyla*, Hb., ought most certainly to occur in the county, but so far I have not met the species in any stage." *A. galactodactyla* has been recorded from Kent and Surrey, and probably some other of the bordering counties.

COLEOPTERA.

Staphylinidæ, subfam. *Aleocharinæ*.

Autalia rivularis, Grav., Bloomsbury (*Brit. Mus.*).

Falagria sulcata, Payk., South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *F. obscura*, Grav., South Kensington (*Pratt*).

Silusa rubiginosa, Er., Hanwell, on bark of elm trees (*Fowler*).

Ocalea latipennis var. *rivularis*, Mill., near Hammersmith (*Champion*).

Euryusa laticollis, Heer, Highgate (*Fowler*).

Microglossa suturalis, Sahl., Acton (*Pratt*).

Aleochara ruficornis, Grav., Hampstead (*Fowler*). *A. fuscipes*, Grav., near Pinner (*Legros*); South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *A. morion* Grav., Bloomsbury (*Brit. Mus.*). *A. lanuginosa*, Grav., Neasden (*Legros*); South Kensington

(*Pratt*); Bloomsbury (*Brit. Mus.*). *A. mœsta*, Grav., Bloomsbury (*Brit. Mus.*). *A. nitida*, Grav., South Kensington (*Pratt*); Bloomsbury (*Brit Mus.*).

Myrmedonia humeralis, Grav., Bloomsbury (*Brit. Mus.*).

Astilbus canaliculatus, Fab., Bloomsbury (*Brit Mus.*).

Ilyobates nigricollis, Payk., Notting Hill, *olim* (*Fowler*).

Calodera nigrita, Mann., Hampstead (*Fowler*). *C. rubens*, Er., Cowley, near Uxbridge (*Fowler*). *C. umbrosa*, Er., Bloomsbury (*Brit. Mus.*).

Alianta incana, Er., Notting Hill, *olim* (*Fowler*).

Chilopora longitarsis, Er., Bloomsbury (*Brit. Mus.*).

Tachyusa concolor, Er., Bloomsbury (*Brit. Mus.*).

Oxypoda spectabilis, Märk., Highgate (*Fowler*). *O. vittata*, Märk., South Kensington (*Pratt*). *O. lentula*, Er., Notting Hill (*Fowler*). *O. pectita*, Sharp, Hammersmith (*Fowler*). *O. umbrata*, Gyll. = *brevicornis*, Steph., Bloomsbury (*Brit. Mus.*). *O. mutata*, Sharp, Colney Hatch (*Fowler*). *O. alternans*, Grav., Bloomsbury (*Brit. Mus.*). *O. recondita*, Kr., Highgate (*Fowler*). *O. hæmorrhoa*, Sahl., South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *O.* (*amœna* var.?) *waterhousei*, Rye, Hampstead (*Waterhouse*). *O. annularis*, Sahl., Hampstead and Highgate (*Fowler*). *O. tarda*, Sharp, South Kensington (*Pratt*).

Homalota: As this genus is so inconveniently large, I divide our species provisionally into sections or groups as seems convenient, mainly after Canon Fowler's arrangement.*

a. *Languidæ.*

Homalota languida, Er., Hammersmith Marshes (*Fowler*).

d. *Fallaces.*

H. fallax, Kr., Notting Hill (*Fowler*).

e. *Elongatulæ.*

H. luridipennis, Mann., Bloomsbury (*Brit. Mus.*). *H. hygrotopora*, Kr., Bloomsbury (*Brit. Mus.*). *H. elongatula*, Grav., Bloomsbury (*Brit. Mus.*).

f. *Glossolæ.*

H. gregaria, Er., Bloomsbury (*Brit. Mus.*).

g. *Paganæ.*

H. vestita, Grav., South Kensington (*Pratt*). *H. sylvicola*, Fuss., Highgate (*Fowler*). *H. vicina*, Steph., Bloomsbury (*Brit. Mus.*). *H. pagana*, Er., Bloomsbury (*Brit. Mus.*).

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* It is rather an innovation to give plural names to the sections, and Canon Fowler, to whom I sent a copy of the list of species and section-names, writes, "I must confess that I do not like the plan at first sight." But the same method has been long in use in Botany, &c., and I believe is a very advantageous one.

i. *Occultæ.*

H. occulta, Er., Bloomsbury (*Brit. Mus.*). *H. picipes*, Thoms., Bloomsbury (*Brit. Mus.*). *H. debilis*, Er., Notting Hill (*Fowler*).

l. *Geminæ.*

H. gemina, Er., Hammersmith Marshes (*Fowler*).

m. *Viles.*

H. analis, Grav., South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *H. decipiens*, Sharp, Hammersmith (*Fowler*).

o. *Hepaticæ.*

H. hepatica, Er., Bloomsbury (*Brit. Mus.*).

q. *Palustres.*

H. xanthopus, Thoms., Kilburn and Hampstead (*Fowler*). *H. triangulum*, Kr., Bloomsbury (*Brit. Mus.*). *H. nigritula*, Wat. = *boletobia*, Thoms., Bloomsbury (*Brit. Mus.*). *H. divisa*, Märk., Bloomsbury (*Brit. Mus.*). *H. palustris*, Kies., Bloomsbury (*Brit. Mus.*).

r. *Autumnales.*

H. autumnalis, Er., Hampstead (*Fowler*).

s. *Inconspicuæ.*

H. mortuorum, Thoms., Highgate (*Fowler*). *H.* (*mortuorum* var. ?) *atricolor*, Sharp, = *inconspicua*, Wat., Bloomsbury (*Brit. Mus.*). *H. inquinula*, Grav., Bloomsbury (*Brit. Mus.*).

u. *Sordidulæ.*

H. nigra, Kr., Bloomsbury (*Brit. Mus.*). *H.* (*celata* var. ?) *germana*, Sharp, Highgate (*Fowler*). *H. celata*, Er., Hampstead (*Fowler*). *H. sordidula*, Er., Bloomsbury (*Brit. Mus.*). *H. canescens*, Sharp, Highgate (*Fowler*).

v. *Marcidæ.*

H. marcida, Er., Highgate (*Fowler*). *H. intermedia*, Thoms., Highgate (*Fowler*). *H. longicornis*, Grav., South Kensington (*Pratt*). *H. lævana*, Muls., Highgate (*Fowler*). *H. cinnamoptera*, Thoms., Hampstead (*Fowler*). *H. villosula*, Kr., Bloomsbury (*Brit. Mus.*). *H. atramentaria*, Gyll., South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *H.* (*lævana* var.) *setigera*, Sharp, Hampstead (*Fowler*).

w. *Sordidæ.*

H. sordida, Marsh. = *melanaria*, Sahl., South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *H. testudinea*, Er., Highgate (*Fowler*).

x. *Subsinuatæ.*

H. laticollis, Steph., Bloomsbury (*Brit. Mus.*). *H. subsinuata*, Er., *castanipes*, Wat., Bloomsbury (*Brit. Mus.*). *H. monti-*

vagans, Woll., Hanwell (*Fowler*). *H. fungi*, Grav., South Kensington (*Pratt*); Bloomsbury (*Brit. Mus.*). *H. orphana*, Er., Hammersmith Marshes (*Fowler*).

Placusa pumilio, Grav., Highgate (*Fowler*).

P. denticulata, Sharp, Bishop's Wood (*Fowler*).

Phlœopora corticalis, Grav., Hampstead (*Fowler*).

Oligota atomaria, Er., Colney Hatch (*Fowler*). *O. inflata*, Mann., Bloomsbury (*Brit. Mus.*). *O. flavicornis*, Lac., Kennington (*Fowler*).

Gyrophæna nana, Payk., Bishop's Wood (*Fowler*). *G. lucidula*, Er., Hammersmith Marshes, *olim* (*Fowler*). *G. minima*, Er., Bishop's Wood (*Fowler*).

3, Fairfax Road, Bedford Park, Chiswick, W.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

NOTES ON LEPIDOPTERA TAKEN IN THE BLOXWORTH DISTRICT IN 1890.—It seems rather late in the day, now that we are just entering upon the season of 1891, to record the entomological doings of 1890; but various circumstances have hitherto prevented the earlier compilation of the following notes. On the general character of the entomological year 1890 I can fully endorse the accounts given of it by many other entomologists. I think I have known seasons as barren, but scarcely any one more so than the past. One night at sugar, in June, produced eight *Aplecta herbida*, one *Leucania comma*, and a few other common Noctuidæ, but on several following nights not a single moth of any kind was seen. Sugaring was again wholly unproductive in August. Many of our commonest Geometridæ were either missing altogether or only appeared as great rarities; nor did I see a single *Plusia gamma* during the whole season. Even wasps were here very scarce (though at Cadbury, in Somerset, there were swarms of them about the end of August). *Psoricoptera gibbosella* was worked for, but not a single specimen was seen where in 1888 we took it in abundance. The above being the general character of the year, we still captured some good things, among which were—*Nemeobius lucina* (not nearly as abundant as in 1889, when twenty-five were netted in one day); *Drepana hamula*; *Tapinostola fulva*; *Tephrosia extersaria*; *Cleora glabraria*, one specimen, just out, in an orchard, new to Dorsetshire; *Eupisteria heparata*, one, worn, new to this district; *Aventia flexula*; *Scoparia mercurella*, a var. of the inland form, corresponding exactly to the var. *S. portlandica*, which occurs amongst those of the species found in the Isle of Portland. *Aciptilia paludum*, only ten examples during many evenings' work. *Peronea comariana* in great abundance among *Comaria palustris* in a swampy spot on the heath; out of 120 specimens taken only three were females; the reddish brown variety of the male was less abundant than the greyer form. *Ditula semifasciana*, two specimens; *Phoxopteryx lundana*, abundant, many of them of large size; *Cnephasia sinuana*, three examples only. *Chrosis audouinana*, one, rather worn: this is only the second specimen I have ever met with here; the other was taken in 1865. *Eupœcilia notulana*, one; *E. pallidana*, several, on the borders of the heath near Wareham; *E. geyeriana*, between fifty and sixty, on a small patch of swamp, from August 5th to 22nd, flying freely at dusk. I am indebted to Mr. Barrett for kindly examining and determining this addition to the Dorset list. *Argyrolepia cnicana*, rather abundant. *Scardia arcella*, several, flying at dusk; *Tinea albipunctella*, one, beaten out among overgrown coppice wood in a swamp: *Phylloporia bistrigella*, several flying at dusk; *Lampronia prælatella*, very abundant; *Cerostoma lucella*, three specimens only; *C. alpella*, only one, where two years ago it was fairly abundant. Of *C. sylvella*, in most seasons fairly common, not one was taken. *Gelechia rhombella*, several in an orchard; *Lita maculea*, one only; *Pœcilia albiceps*, one; *Ptocheuusa subocellea*, several, among marjoram: *Cleodora cytisella*, one only; *Chelaria hübnerella*, unusually abundant—among them a variety with the usually dark blackish mark on the costa of a bright rufous colour; *Glyphipteryx thrasonella*, so abundant as to be quite a pest. *Tinagma betulæ*; the occurrence of this species has already been noticed in the 'Entomological Monthly Magazine' (Feb. 1891, p. 48), by Mr. Eustace Bankes, who was the first to observe its work here on the birch leaves last autumn. Subsequently I found a fine example of the perfect insect in my cabinet, doubtfully placed under *resplendellum*, and kindly determined to be *T. betulæ* by Dr. Wood. This specimen was caught on the wing in July, 1887. The little oval holes cut out by the larvæ, near the footstalk of the birch leaves, were abundant; on the dwarf birch bushes I often found six or seven on each. Whether we shall be able to detect the larvæ while feeding inside the birch shoots, next summer, or obtain the perfect insect in any quantity by breeding or sweeping, remains to be seen; but that it is an abundant species here there seems to be little doubt. *Gracilaria elongella*, in an oak and birch wood; *Chauliodus illigerellus*, frequent, flying at dusk, but not as abundant as in some past seasons; *Laverna paludicolella*, one only, of unusual size; *L. lacteella*, not unfrequent, flying rapidly at dusk, and swept among herbage; *Chrysoclysta schrankella*, fairly abundant, by sweeping, and flying in sunshine, but very local. *Asychna terminella*: several of this little gem flying at dusk, and swept among low underwood and coarse herbage. *Elachista gleichenella*, several; *E. monticola*, not rare (appears to be very like *E. poellæ*), new to Dorset—my examples have, some of them, been determined by Mr. Stainton; *E. paludum*, four examples, in a swamp among sedgy grass, new to Dorset. *Lithocolletis anderidæ*, bred from mines in birch-leaves gathered in the previous October, new to Dorset: on this species see notes by Mr. N. M. Richardson (Ent. Month. Mag., Jan. 1891, p. 22), and by Mr. H. T. Stainton (*l. c.* 1890, p. 192). *Bucculatrix aurimaculella*, several, swept; *Nepticula æneofasciella*, several, bred from mines in wild strawberry-leaves gathered in November, 1889; *N. gei*, one, bred also from wild strawberry-leaves. — O. P. Cambridge; Bloxworth Rectory, March 10, 1891.

Notes on the Lepidoptera of Middlesex.—*Argynnis euphrosyne* was formerly common in Highgate Wood; when I first visited this locality, in 1855, I met with the species in abundance, and took it there for several subsequent years. *Hesperia sylvanus* was also common then in the same spot; and a few *Syrichthus alveolus*. In some grassy hollows on the edge of Coleford Wood at Fortiss Green, I used, about the same time, to take *Thanaos tages*, *Hesperia linea*, *Epinephele hyperanthus*, and many other species. I merely mention the above Rhopalocera, as being the nearest place to the metropolis that I have ever met with them, and where (alas!) they will, I fear, never be met with again.—C. J. BIGGS; 3, Stanley Terrace, West Ham Park, E.

CAPTURES AT GAS-LAMPS.—My notes record the final break-up of "the great frost" on January 23rd. On and after the 27th, a few *Cheimatobia brumata* appeared on the gas-lamps. Whether before or after Christmas, I have never previously seen this moth in such small numbers at the lamps. I worked hard in November for *Pœcilocampa populi* and *Asteroscopus sphinx* (*cassinea*), but failed to come across a single specimen. In fact, to quote another local entomologist, "there have been very few moths at the lamps this season." February 3rd brought out *Phigalia pedaria* (*pilosaria*, dark forms) and *Hybernia rupicapraria*. Additional insects up to date (February 10th) are as follows:—February 6th, *H. marginaria* (*progemmaria*); February 7th, dark forms of *H. defoliaria*. *C. brumata* apparently disappeared with the end of January.—J. ARKLE; 2, George Street, Chester.

ASSEMBLING.—I shall be greatly obliged to any reader of the 'Entomologist' who can give a complete catalogue of all the species in which "assembling" has been observed. I believe that besides the *Bombyx* group, instances are known also among the Geometræ. Has it ever been observed in any Noctuæ or Sphinges also?—F. H. PERRY COSTE; Ravenshoe, Burnt Ash, March 4, 1891.

PIERIS RAPÆ IN FEBRUARY, 1891.—I noticed a specimen of this insect flying about some laurels in this neighbourhood on February 25th. Besides the ones recorded in the March number, the only instance I have been able to find of so early a date is quoted by Newman ('British Butterflies'), from 'Entomologist,' vol. iv. p. 80: this was February 24th. —H. A. EVANS; Westward Ho, North Devon.

HYBERNIA DEFOLIARIA IN FEBRUARY.—Last month (February) I heard from a friend, who only began to collect in 1890, and whose knowledge is, therefore, chiefly derived from books, that he had just taken an insect which seemed to agree with *H. defoliaria*, but which could not be that species, as Newman gives October, and Stainton, October and November, for its appearance. I wrote back to say that the moth was, nevertheless, *H. defoliaria*. The first year I ever remember seeing *defoliaria* later than November was in January, 1884, and, being much surprised, I mentioned it when writing to Mr. Harwood, of Colchester, who informed me that he came across the species occasionally during the early months of spring. Since that year I have noticed it once or twice sitting on park fences in January and February; but, whereas last year I found a single specimen only (January 16th), this year I came across as many as ten—one each on January 23rd and 28th, seven on February 4th, and one on March 4th, the latter being the latest date I have recorded. These specimens were all males; but I find I have in my cabinet a female, labelled "24th February, 1885." None of the males were in fine condition, so that I presume they were born in October or November, and managed to survive the rigours of an English winter; hence I am surprised at taking so many specimens this spring, the winter of 1890–91 being one of the severest on record. If my hypothesis (of hybernation) be correct, *H. defoliaria* is by far the earliest hybernated species to venture forth after its winter sleep, preceding even *Depressaria applana*, so far as my experience goes.—(Rev.) GILBERT H. RAYNOR; Victoria House, Brentwood, Essex, March 16, 1891.

Entomology of the Portsmouth District.—I am desirous of making a complete catalogue of the entomology of the Portsmouth district, and would be glad if entomologists who have collected in this district will let me have lists of their captures in all orders. Lists will be returned, if desired.—W. T. Pearce; 101, Mayfield Road, Seafield, Gosport.

Another Nauseous Insect eaten by a Woodpecker.—On the 28th of January last, I received from Mr. W. Perry, of Broxton Old Hall, Cheshire, a female specimen of the great spotted woodpecker (*Picus major*, L.), which had been shot in that neighbourhood. On examining the stomach of this bird, I was very agreeably surprised to find that it contained at least four specimens of a *Coccinella*, undoubtedly the very common *Hippodamia variegata*, Goez. (= *mutabilis*, Schrib.). In addition to these there were a number of the larvæ, and two imagines, of *Rhagium bifasciatum*;* the former almost filled the stomach, and several of them were almost digested, their heads only remaining, which proves, beyond all doubt, that they were eaten sometime before the *Coccinella*, as the latter were quite fresh at the time of my examination. This, I think, should prove of some interest to those who are at all interested in the "uses of colours in animals," or in the Darwinian theory. In his very interesting little book ('Colours of Animals,' p. 180), Mr. E. B. Poulton says:—"That ladybirds are eaten by green tree-frogs in winter, when other insect-food is scarce; and also by hungry birds, although intensely disliked, and are refused (at any rate, by the frogs) if other food can be obtained." Mr. Poulton kindly informed me that these facts are based entirely upon experiments with captive animals; hitherto, nothing in a state of nature has been known to feed upon the Coccinellidæ. At first sight my observations appear to verify Mr. Poulton's statements, but the woodpecker could not have been in a state of hunger when it ate the nauseous insects, for reasons previously stated. We must also bear in mind that the woodpeckers are less affected by severe weather than any other bird, as the greater part of their food is obtained from timber, which is always available. I am, therefore, of opinion that this species of woodpeckers, and probably other members of the genus, like the cuckoo [*ante*, pp. 19, 77], will feed upon nauseous insects at any time of the year; this, however, can only be proved by the examination of birds during months when plenty of edible food is available. I hope that my very brief remarks may incite others, who have the opportunity to examine the stomachs of insectivorous birds, to do so whenever opportunity offers; curators of museums, abroad as well as in this country, could help very materially by preserving the stomachs for any specialist who might care to examine them. Degraded as this branch of Entomology may appear to many, it is, nevertheless, of very great interest. I should be very glad to hear the opinions of others who are interested in this subject.—R. Newstead; Grosvenor Museum, Chester, March 14, 1891.

Late Emergence of Pœcilocampa populi.—During the week ending January 24th a female specimen of *Pœcilocampa populi* emerged in breeding-cage kept out of doors. Doubtless the extreme cold for some time previous retarded its emergence. I have obtained many ova from this *unimpregnated* specimen, the greater portion dark in colour, with all the *appearance* of fertile ova, the remainder being a light red-brown. — T. B. Jefferys; Bath, February 3, 1891.

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* The larvæ of this coleopteron seem to be their favourite food, as I have found them in other examples that I have examined.—R. N.

Annual Exhibition of the South London Entomological and Natural History Society.—The Exhibitions of this Society have, year by year, been increasingly successful, and there is but little doubt that the exhibition announced to be held at the Bridge House Hotel, London Bridge, on the 15th and 16th of April next, will be quite equal to, if it does not surpass, any of the Society's previous achievements. Evidence of the popularity of these "shows" is found not only in the very large attendance on each occasion that an entertainment of the kind is provided, but also in the fact that if from any cause the exhibition is not held in any year there is general disappointment, and a feeling that a distinct void has occurred in the record of that year. Several circumstances conspired to prevent the Society holding their "Annual" last year; but the outcome of the failure in the autumn of 1890 is a spring exhibition in the present year, so that instead of a loss we have what should prove a decided gain. The Hon. Sec., Mr. H. W. Barker, 83, Brayards Road, Peckham, S.E., will be pleased to hear from anyone wishing to assist by exhibiting entomological or other objects of Natural History.

SOCIETIES.

Entomological Society of London.—*March 4th*, 1891.—The Right Hon. Lord Walsingham, M.A., F.R.S., Vice-President, in the chair. Mr. H. St. John Donisthorpe, Mr. F. W. Frohawk, Mr. Charles Fryer, Mr. G. F. Hampson, B.A., Mr. Frederick J. Hanbury, F.L.S., and Mr. G. B. Routledge, were admitted into the Society. Mr. F. P. Pascoe exhibited, and made remarks on, a curious Coleopterous larva with a case somewhat resembling that of the Lepidopterous genus *Psyche*, which was found at the Theatre of Bacchus, Athens. Mr. J. W. Douglas sent for exhibition specimens of *Icerya* (*Crossatosoma*) *ægyptiaca*, which, through the kindness of Mr. A. D. Michael, he had received from Alexandria on the 19th January last. It was stated that in travelling most of them had become loose, and had lost their waxen appendages; but a few still remained on the stems of their food-plant. In connection with this subject, Mr. G. H. Verrall alluded to a Dipterous parasite of *Icerya* from Adelaide, —*Lestophonus iceryæ*, Williston,—which had been bred from *Icerya purchasi*, Mask., last February. Mr. M'Lachlan and Lord Walsingham continued the discussion. Mr. R. Adkin exhibited a long and interesting series of *Triphæna comes* from various parts of the South of England, Yorkshire, Forres, the Isle of Man, the Isle of Lewis, and the North of Ireland. Mr. G. F. Hampson exhibited a series of varieties of *Plotheia frontalis*, Walk., which was the only species in the genus, and confined to Ceylon. He said that the varied forms of this species had been described under twenty-one different names by Walker, Felder, and Moore. Mr. F. Merrifield showed a number of specimens of *Selenia illustraria*, of three different stocks, proving that the spring brood of this species, which passed the winter in the pupal stage, was, like the summer pupa, materially affected in colouring by the temperature to which the pupa had been exposed in its later stages. He thought this fact, coupled with similar results ascertained with respect to the single-brooded *Ennomos autumnaria*, indicated that the operating cause was one of wide general application, and that valuable results might be looked for if entomologists would turn their attention to the subject. Capt. Elwes said that in his experience in many parts of the Palæarctic region, in Japan, in the Taunus Mountains, in the Canary Islands, and elsewhere, where there was a combination of heat and moisture, all the commoner species of Lepidoptera occurring in this country attained a larger size and a greater brilliancy of colouring than in colder and drier regions; and he referred to such species, amongst others, as *Pieris brassicæ* and *Argynnis paphia*. The discussion was continued by Mr. Jacoby, Mr. Fenn, and others. Mr. W. H. B. Fletcher exhibited a long series of *Zygæna lonicera* from York, and *Zygæna filipendulæ* from Shoreham, Sussex; also a series of hybrids obtained by crossing these two species. He stated that the eggs obtained from these hybrids were all infertile. Lord Walsingham said this latter fact was extremely interesting. Mr. F. W. Frohawk exhibited a living specimen of an ichneumon which had just emerged from a chrysalis of *Papilio taunus*. Mr. C. J. Gahan exhibited a number of species belonging to the genera *Lema* and *Diabrotica*, and read a paper on them, entitled "On mimetic resemblances between species of the Coleopterous genera *Lema* and *Diabrotica*." Lord Walsingham, Mr. Jacoby, Colonel Swinhoe, and Mr. Champion took part in the discussion which ensued.—H. Goss and W. W. FOWLER, *Hon. Secs.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —*February* 26*th*, 1891. Mr. W. H. Tugwell, President, in the chair. Mr. R. J. Anderson, of Suez, was elected a member. Mr. Adye exhibited an unusually dark form of *Notodonta camelina*, L., with other forms of the species. Mr. H. Moore, *Erebus odora* from South America. Mr. Turner, *Melanippe fluctuata*, L., taken at Brockley; the specimens showed considerable variation. Mr. Cockerell, *Heliothis armigera*, var. *umbrosa*, Grote, from Wet Mountain Valley, Colorado, larger than the type, the upper wings more or less olivaceous above, the under wings almost without markings below. Mr. Cockerell made some remarks on *Leucania unipuncta*, which he stated was a great scourge in America, and was there known as the army worm. Mr. R. Adkin exhibited long series of the species of the genus *Triphæna*, Och., from many localities in the British Islands, together with continental series of some of the species for comparison, and read notes dealing with the geographical distribution and general and local variation of the species exhibited. In dealing with *T. comes* he pointed out Hübner's typical form, the varieties *adsequa* and *prosequa* of Treitschke, and *curtisii* of Newman, also Hübner's *consequa*, which he considered should be regarded as a form of this species rather than of *orbona*, Hufn., to which it had hitherto been referred, and supported his contention by specimens known to be forms of *comes*, Hb., which agreed with Hübner's figure of *consequa*. He also described the distinguishing characters of these varieties, and gave notes on the nomenclature of the species. Mr. C. Fenn exhibited examples of the genus *Triphæna* from Forres. Mr. McArthur, *T. comes* from the Isle of Lewis, and *T. ianthina* from Northumberland. Mr. Turner, *T. pronuba* from Brockley, Kent. Mr. South and Mr. Tugwell also showed varieties of many species of the genus, and a discussion ensued, Messrs. South, Fenn, Tugwell, Adkin, and others taking part. Mr. E. Step exhibited an hybernating specimen of *Vespa germanica* (female); Mr. Billups remarked that he had taken this species as early as the 17th January in a previous year.

March 12*th*.—The President in the chair. Mr. E. F. Elton, of Wokingham, was elected a member. The Secretary read a report of a Committee which had been appointed to enquire into the numerical and financial position of the Society, from which it appeared that since the year 1885 the number of members had increased yearly, and as a consequence, so also had the finances of the Society. Mr. R. Adkin exhibited *Pædisca solandriana*, L., bred from larvæ feeding in shoots of birch from Aberdeen; and, on behalf of Mr. W. Smith, sundry Tortrices and Crambites from Paisley, including a white and dark-blotched variety of *Pædisca solandriana*, and an unusually white form of *Crambus pratellus*, L. Mr. R. South, *Vanessa urticæ*, L., to show the geographical distribution and local variation. Mr. Adye, varieties of *Abraxas grossulariata*, L. Mr. Robinson, specimens of a *Pygæra* which he stated had been supposed to be *P. curtula;* they were bought cheap in 1876. Mr. Tugwell stated it was difficult to say what the species was if it was not *curtula;* he had seen the form before. Mr. Tutt remarked that he had seen the form in the Doubleday Collection. Mr. Carrington exhibited and made remarks upon some plants collected by him at Toulon. Mr. Billups read a paper on the Hymenopterous and Dipterous parasites bred by members of the Society during the years 1889–90; the paper was illustrated by the exhibition of the various species mentioned in the paper, and in many cases by the host from which the parasites had been bred.—H. W. BARKER, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*February* 16*th*, 1891.—Mr. R. C. Bradley in the chair. Messrs. C. J. Fryer, Warwick; and A. Madeley, Dudley, were elected members of the Society. Mr. R. C. Bradley showed *Sphenella marginata* from Bournemouth. Mr. E. C. Tye read a paper (written conjointly with Mr. G. W. Wynn) on the Lepidoptera of Marston Green. It was written with the purpose of showing what might be, rather than what had been, done there; and to urge the members to work the district, which was the best ground lying within easy reach of Birmingham. The paper described the ground, which includes Packington Park and many fine lanes and woods; and also included a short list of good things already taken there.

March 2*nd*, 1891.—Mr. R. C. Bradley in the chair. Mr. J. J. Quirke, jun., Handsworth, was elected a member. Mr. R. C. Bradley showed *Trypeta centauriæ* from Moseley. Mr. G. H. Kenrick, a specimen of *Triphæna pronuba*, bred January, this year, from egg found on a withered lime leaf in first week of September, 1890. Mr. Kenrick read a paper on "Temperature, its effects on some insects not found in this district," in which he pointed out the great importance of temperature in affecting the distribution of insects. He pointed out the fact that most insects were very susceptible to heat or cold at some period in their life, which period varies in different species, and that a few degrees would often seriously affect them; and he quoted a number of species of butterflies in illustration, showing how their range in this country was undoubtedly affected by temperature. He suggested that species would often be isolated by their inability to stand slight alterations in heat and cold, and would thus be in a position to diverge from closely-allied forms, thus favouring evolution.—COLBRAN J. WAINWRIGHT, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—*March* 9*th*, 1891.—The President, S. J. Capper, F.L.S., F.E.S., in the chair. Mr. Brocton Tomlin was elected a member. A paper by Mr. Herbert Stott was read, on "A parasitic fungus forming its base in the larva of a New Zealand Lepidopteron," illustrated by specimens and drawings. The Hon.

Sec., F. N. Pierce, read a paper entitled "Notes on the genital armature of the genus *Miana*," in which he referred to the recent controversy respecting the distinctiveness of the two species, *M. strigilis* and *M. fasciuncula*, and proved, by the examination of the structure of the genital armature, that they were specifically different; the paper was illustrated by the author's preparations thrown on a screen, by the aid of oxy-hydrogen Micro lantern; and exhibits of specimens from various parts of the country by the President and members.—F. N. Pierce, *Hon. Sec.*

OBITUARY.

Robert Calvert, of Bishop Auckland, in the county of Durham, died on the 21st of February last, in the 76th year of his age. Mr. Calvert commenced his business career as a printer in his native town, but subsequently he went to Sunderland, where he successfully carried on a grocery business. Ultimately, however, he returned to Bishop Auckland, and became the leading auctioneer and valuer of the district. Throughout an active and busy life, he always found time to study the fauna and flora of the county of Durham; and perhaps there are few men so intimate with the Natural History of their own county as Mr. Calvert was with that of his. No natural object, whether animate or inanimate, was passed unheeded. If it was known to him, then perhaps the locality in which it occurred would be new, and the circumstance be duly noted. If, on the other hand, the object was something with which he was unacquainted, it was secured, and the work entailed in its subsequent identification looked upon as a distinct pleasure. His entomological collections testify to the assiduity with which he investigated this section of his county's fauna. Although he persistently refrained from taking an active part in the discussion of scientific matters, he had well-formed opinions on most of the questions which exercise the minds of naturalists generally and entomologists in particular. His memory was a veritable storehouse of facts and observations; and it was this which lent a special charm to his companionship in an entomological ramble, for he always had some interesting reminiscence in connection with almost every nook and corner of his native county. In 1884 he published a most interesting and valuable book, entitled 'Notes on the Geology and Natural History of the county of Durham,' in the preface to which he wrote:—"For upwards of fifty years of a busy life, the observation of Natural History objects and the collection of specimens have formed the recreation of my leisure hours, and, in the retrospect of the past, yield unalloyed satisfaction and pleasure. About two years since, affliction forced me to give up the active duties of life, and since that time I have had to spend the greater portion of my time at home, deprived of the longed-for rambles to which the pursuit of Natural History ever gives a charm. To occupy my time, I commenced to write the notes which have swelled out to the present volume; and some of my friends thinking they may be of service in directing youth in the pursuit of Geology and Natural History, they are now submitted for their use." The perusal of this book causes one to feel regret that it is the only contribution to Natural History literature from his able pen.—R. S.

THE ENTOMOLOGIST.

VOL. XXIV.] MAY, 1891. [No. 336.

THE SIGNIFICANCE OF OCCASIONAL, AND APPARENTLY UNIMPORTANT, MARKINGS IN LEPIDOPTERA.

By J. Jenner Weir, F.L.S., &c.

It has, no doubt, not escaped the notice of British entomologists that in *Papilio machaon* the first submarginal lunule, on the upper side of the lower wings, is often not purely yellow, but more or less suffused with red.

In English specimens of the insect I find this marking existing in females very commonly; in a female from Hyères it is faintly visible; in one out of four, from Japan, it can be seen; and is very well shown in a large female I have from Loo Choo Islands. I do not find this red mark in specimens taken by myself in Saxony, and in the Alhambra, at Granada, in Spain. Judging from those in my own cabinet it does not exist in the European *Papilio alexanor*, the Japanese *P. xuthus*, the American *P. zolicaon* and *P. americus*: in Mr. Edwards' work on the 'Butterflies of North America' the marking is not shown in the plates of *P. indra* and *P. bairdii*; it reappears very faintly in the female of *P. polyxenes*, and very prominently in the female of *P. brevicauda*; this latter has, however, the yellow markings much suffused with red.

In the allied genera of Papilioninæ I do not find the marking in *Iphiclides podalirius*, nor in the American *I. ajax* and its horeomorphic varieties.

In the genus *Jasoniades*, another allied division of that aptly-termed "magazine genus" *Papilio*, it exists very strongly marked in *J. glaucus*, the black dimorphic female of *J. turnus*, and in the latter yellow form in both sexes; but in this species it is often very indistinct, and I have a male specimen from Moose Factory, St. James' Bay, in which no trace of it can be seen. In *Jasoniades rutilus* there is sometimes a faint trace of red in the lunule, but not in *J. eurymedon*; and in *J. daunus* there is not the faintest trace of the marking—indeed, the first submarginal lunule is almost obsolete.

In the American *Euphœades troilus* a bright red spot is found, but it is shifted back, and is a costal marking, appearing at the upper end of the blue central band of the under wings; but even in this butterfly, where it is usually very strongly developed, it is not always to be found. Mr. Scudder, in his admirable work on the 'Butterflies of the Eastern United States and Canada' (p. 1317), writes of "a specimen in which the normally orange lunule next the costal edge of the upper surface of the hind wings has no orange in it, but is of the same greenish colour as the other spots"; and I fortunately possess in my cabinet a similar example. Mr. Scudder does not state the sex of the variety, but mine is a female—a most important fact, as will be seen below, to my argument. *Euphœades palamides* does not show a trace of the reddish suffused mark under consideration. It is well here to remark that it often happens that the second lunule of the hind wings has a trace of the reddish or orange colour: this may be occasionally found in *Papilio machaon.*

Enough has been written to illustrate the fact that throughout several of the species of Papilioninæ, belonging to at least three different but more or less allied genera, there is a reddish suffusion in the upper lunule or lunules of the hind wings—that it is sometimes absent in species that usually possess it, but that, as far as my experience goes, when so absent it is in the male sex. The problem I have now to deal with is the significance of such a trivial marking. Is it rudimentary of a coloration in course of evolution? or, on the other hand, is it vestigial of a marking which has become partially, or even perfectly in some specimens, obsolete? I am inclined to hold the latter view, for the following reasons:—In all the species dealt with there is, at the anal angle of the hind wings, a more or less distinct ocellus, with red pupil or patch: this is very well marked in *Papilio machaon.* The red becomes more of an iris in some species, because there is a black spot in the centre, as in *P. xuthus*, *P. polyxenes*, *P. brevicauda*, *P. zolicaon*, and *P. americus.* In *Jasoniades* and *Euphœades* the ocellus is blurred, but the red colour is to be found in every species of these genera at the anal angle of the hind wings.

Arguing from *à priori* considerations, one would be inclined to consider that the reddish or orange suffusion in question was the nearly obsolete trace of an ocellus which had once existed in the ancestors of these butterflies. The question then arises as to whether any facts can be adduced in support of such a hypothesis.

Africa is a continent which has not undergone those stupendous geological changes which have affected so profoundly the palæarctic and nearctic regions, from which my illustrations have been drawn, and in which, therefore, some archaic forms of Papilioninæ might be expected to be found.

Orpheides demoleus is a well-known and very common African butterfly, which has an ocellus both on the costa and on the anal angle of the lower wings, but it is only the lower ocellus that has much red around the pupil; still I have a specimen with the costal ocellus well marked with red, exactly in the same part of the wing that a similar orange spot is found in *Euphœades troilus*, and in all cases the dark centre of the pupil is suffused with red. In the very closely allied Indian species, *Orpheides erithonius*, I cannot detect any red around the upper ocellus; the lower has a large patch of that colour, but, regarded as an ocellus, it is indistinct, especially in the males; indeed, in both these species the costal ocellus is much better defined than that at the anal angle. Both are without tails, and it would seem that the development of the tails in *Papilio*, *Jasoniades* and *Euphœades*, destroyed the original bilateral symmetry of the under wings, and reduced the costal ocellus to a mere vestige: and in *Iphiclides*, where the tails are more developed, even the slight vestige has disappeared. The shape of the wing in this last-mentioned genus is quite different from that of *Papilio*—the length of the tails seem to have been effected at the expense of the breadth of the wing; indeed, in this respect *Iphiclides* approaches more nearly to the contour of the wing of *Leptocircus*.

A similar remark applies to the Indian genus of Swallow-tails, *Pathisa:* in *P. agetes* there are red spots above an obsolete ocellus in the anal angle of the wing, but no red at the upper angle; in some of the other species even the red at the anal angle has faded into yellow—e. g., *P. paphus* and *P. glycerion*, and in *P. antiphates* the yellow above the pseudocellus has disappeared.

There is another genus of African Papilioninæ possessing large tails, and in the male sex, on the upper wings, there are androconia on the submedian nervure and median nervules clothed with short cotton-like scales. I do not think this genus has been named, but it appropriately might be called *Erioptera*. In *E. ophidicephalus*, although a tailed species, the upper ocellus is developed in the lower wing; but it may be added that, in this species, the ocellus at the anal angle is very largely developed, and that there are indications of a second one above the third submedian nervule. In the very closely allied species, *E. menestheus*, the upper ocellus is absent, and in its place there is a costal red spot, exactly in the same position as the orange spot in *Euphœides troilus*, above adverted to. In *E. constantinus* there is no trace of red in the upper lunules of the under wings.

The possession of a costal ocellus is very rare in the Papilioninæ. In Dr. Staudinger's 'Exotische Schmetterlinge,' where nearly a hundred species of this subfamily are figured, the only one delineated with the ocellus in question is *Orpheides demoleus*, which, as before stated, is, in my opinion, an archaic form, the larva of which has considerable resemblance to that of *Jasoniades glaucus*.

I am therefore of opinion that the insignificant red suffusion on the first lunule of *Papilio machaon* is the evanescent vestige of an ocellus, in the ancestral form from which this and several other allied species of Papilioninæ have descended, and, as such, is not without its value as a contribution towards the philogeny of the genera above dealt with. I am the more inclined to this view because I find this vestigial marking more often to be found in the females of a species than in the males, the former being, as very well put by Prof. Westwood, the more conservative sex.

Beckenham, March 28, 1891.

THE RE-DEVELOPMENT OF LOST LIMBS IN THE INSECTA.

By John Watson.*

It is by no means rare to find instances of the re-development of lost limbs in the Crustacea and spiders; but I have not found any such cases mentioned as occurring amongst the Insecta.

That it is not unusual amongst insects, I have now no doubt, as I have myself had three cases of re-development of limbs and one case of complete cicatrisation (or healing of a wound), which prove that such re-development can and does take place; and at either the larval or pupal stages of the insect's metamorphosis. By re-development I mean, the renewal or growth of a new limb, or part, from the socket or stump of one which has either been pulled off, or amputated. The first case of insect re-development which I recorded, occurred in the larva of *Platysamia cecropia* (a North American silk moth). This was an accidental case, and induced me to experiment, with a view to further my knowledge of this subject.

While rearing the larvæ of this moth a year or two ago, I noticed one, in the fourth age (*i. e.*, one that has moulted three times), had had one of the mesothoracic legs bitten off, or otherwise amputated, probably bitten off by another larva. There was no trace of the femur, except a small piece of the skin, loose and dead. The amputation had only taken place the day I had noticed it, as the surrounding skin was still wet with the extravasated blood, which, at the edges, was already hardening as it dried. I carefully watched this larva through its last larval moult, and on its emergence in the fifth age, I saw that where the leg should have been was a small conical swelling with a black apex. This swelling was slightly paler in colour than the surrounding skin.

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* A paper read before the Scientific Section of the Manchester Literary and *Philosophical Society*.

At the time this occurred, I was undetermined whether this cone was the commencement of the re-developing leg, or was merely an inflamed area, and the black tip the cicatrix of the amputation; but, as subsequent events have lately proved, I believe it to have been the early development of a new leg.

During the fifth age this swelling (appreciably) did not grow more in proportion than the rest of the body, and the larva spun up its cocoon as usual. An early examination of the pupa revealed the fact that no new leg had then been developed; at all events as far as could be determined by outward examination. In the front of the pupa there was a groove, just as if when the pupal skin was soft the leg had been lifted up and severed off as high and near the body as could be reached. I examined this pupa at various times, to see if I could observe any trace of a new leg, as the pupal skin at the base of this groove was thin, chitinous, and almost transparent. However, I could not see any growth, even as late as two days prior to the insect's emergence, when it was minutely examined by myself and Mr. E. C. Stump, of the Manchester Microscopical Society. The moth emerged, and lo! there was a leg. This I examined, and found it had the usual number of joints, and was freely movable, the only difference being that it was about one-third the size of the corresponding leg on the other side. I exhibited this moth alive, and gave its history, at the Lower Mosley Street Natural History Society, where it attracted considerable attention. When running or walking, it tucked this leg up under the thorax, and used the other five.

The second case to mention is not one of complete re-development, but rather one of complete cicatrisation of a wound received by a pupa; cicatrisation being the primary commencement before re-development can take place; and as this occurred at a late stage of insect life, it is my excuse for mentioning it here.

I was opening a cocoon of *Antherea mylitta*, when my pen-knife went a little too deep, with the result that I cut into the pupa in a diagonal line across the right antenna cover, and in a line from about the middle of the costal margin of the forewing to near the centre of the discoidal cell. The wound bled freely, so freely indeed that I had no hopes of it living, and not liking to throw it away, but rather wishing to have it as a specimen, I put it away. Examination a day or two later showed that the pupa was still alive, and the wound had stopped bleeding. The blood had hardened over the wound and prevented any more oozing out. The pupa was much shrunk and contracted. Seeing it still alive, I again placed it in my hatching cage, hoping it would still live on and emerge, which it did. This moth emerged a little later than the others, and when examined I found that the cut wing had totally healed, and cicatrisation of both nervures and membranes had taken place. The right antenna had never developed beyond the cut, and only the stump was left. There is here also a tendency to re-development, inasmuch as the stump of the antenna was split down the shaft for a half of the distance, and what would have been the centre of the shaft had rounded off, and along this side there is a slight trace of the pectination developing. The pectination on the other and normal side of this half of the antenna being as usual, though somewhat distorted; when I saw the moth emerge, I never expected to see its wings develop, and was much surprised to find they did. The mark of the cut and cicatrix can be noticed on the right upper wing, extending from the middle of the costal margin to just the inner side of the eye spot.

The third case was in the instance of the larva of the puss moth. In the fourth age I ligatured with fine silk two legs of this larva, as high against the body as I could; I then severed the legs off with fine scissors. I let the larva feed, and at the next moult I found that two new legs had developed, though not perfect, as the last joint and the hooks were missing; but they had developed to a much further degree than had the larva of my first case—*cecropia*, because they were at a much earlier period of larval life. This larva is now undergoing preparation for microscopical examination and sectioning, with a view to working out the histology of the subject.

The fourth case I now exhibit alive. About November last (1890), I obtained some dragonfly larvæ (*Agrion*, I believe), and ligatured up against the body the left mesothoracic leg of one of them. I then severed it off. This larva I then placed in a tank where there was a good supply of food. Not having previously bred these insects, I began to doubt (as two months elapsed, and no new leg) of its ever re-developing the leg. I thought it had moulted and I had not seen it. But while in Mr. James Hart's possession (who was taking microscopic life out of the tank the larva was in), it moulted and produced the new limb. As far as I can discern there are the usual number of joints, but the hook at the last joint is missing. This leg (as usual in all these cases of re-development) is much inferior in size than its fellow member. I shall endeavour to keep this larva alive, as perhaps, at the next moult, the leg will grow to a larger size, till, with each succeeding moult it becomes larger, and will equal the normal size. I find that the tendency to re-development is much greater at the early ages of insects, and also that the lower groups of the Insecta can re-develop to a greater degree, and at a later stage of their existence than higher members of the Insecta. I am experimenting now with pupæ, and may have some other cases to record later on.

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CONCERNING DR. CHAPMAN'S DIVISIONS OF THE GENUS *ACRONYCTA* (AUCT.).

By A. G. Butler. F.L.S., F.Z.S., &c.

In the 'Entomologist's Record' for May, 1890, vol. i. n. 2, Dr. Chapman proposed three names—*Viminia, Cuspidia,* and *Bisulcia*—to be used in a subgeneric sense for groups of *Acronycta*. The types of these subgenera are respectively—

A. rumicis for *Viminia.*
A. psi „ *Cuspidia.*
A. ligustri „ *Bisulcia.*

In the Index to some of the plates these names appear as genera, and consequently they have been adopted as genera by several writers in the 'Entomologist's Record,' as follows:—

Viminia	*auricoma*, Chapman,	Ent. Rec.	1890,	p. 29.
„	*myricæ*, „	„	„	84.
„	*menyanthidis*, „	„	„	84.
„	*venosa*, „	„	„	84.
„	*rumicis*, „	„	„	29.
Cuspidia	*psi*, Tutt,	„	„	89.
„	*tridens*, Chapman,	„	„	29.
„	*alni*, B. Smith,	„	„	136.
„	*megacephala*, H. L. Turner,	„	„	349.
„	*leporina*, Hewett,	„	„	132.
„	*aceris*, Lewcock & Hanes,	„	„	167.
Bisulcia	*ligustri*, Chapman,	„	„	29.

For the above facts I am indebted to my friend Mr. T. D. A. Cockerell, who wishes me to call attention to the fact that, as the genus *Acronycta* was subdivided many years previous to Dr. Chapman's revision, his subgeneric or generic names for the species cannot be admitted as valid.

As long ago as about 1820, Hübner broke up the genus in his 'Verzeichniss bekannter Schmetterlinge,' pp. 201, 202, as follows:—

Hyboma strigosa and *unicornis.*
Triæna psi. cuspis, tridens; tritona, and *teligera.*
Jocheæra alni.
Acronicta leporina and *bradyporina.*
Pharetra auricoma and *menyanthidis.*
Arctomyscis aceris, euphorbiæ, esulæ, euphrasiæ, cyparissiæ. and *megacephala.*

In my paper on the natural affinities of *Acronycta* (Trans. Ent. Soc. 1879, pp. 313—17) I called attention to Hübner's subdivision of the group, and proposed to adopt his names as genera, based *principally* upon larval characters.

In Augustus R. Grote's 'New Check-List of North American

Moths,' published in 1882, at pp. 22, 23, the author adopts Hübner's stirps *Apatelæ*, in the singular number, to supersede *Acronycta* (literally *Acronicta*, sic, Ochs.), and subdivides it into groups as follows:—

Triæna,	to include	20	species.
Jocheæra,	,,	2	,,
Merolonche,	,,	2	,,
Acronycta,	,,	3	,,
Megacronycta,	,,	3	,,
Apatela,	,,	14	,,
Lepitoreuma,	,,	5	,,
Arctomyscis,	,,	1	,,
Mastiphanes,	,,	4	,,
Eulonche,	,,	3	,,

Grote's species, when placed under Hübner's generic names, are nearly allied to the European species referred to these genera by Hübner.

When a genus has already been broken up into about a dozen named groups, it is absurd for a later author to ignore the types of those groups, and to break up the original genus on his own lines without reference to the work already done by his predecessors; it is, in fact, a wilful burdening of the synonymy with names which will only be used by those unacquainted with the laws of zoological nomenclature, and will consequently be a source of considerable confusion.

Viminia, Chapman, falls before *Pharetra*.
Cuspidia, ,, ,, *Triæna*.
Bisulcia, ,, ,, *Arctomyscis*.

Supposing Dr. Chapman to be in accord with those authors who are unconstitutional enough to ignore Hübner; he cannot, upon any ground whatever, ignore either my paper or the works of Grote; so that the names proposed by Hübner must stand, even though the authorship of the divisions so named be denied to him, and Butler or Grote be quoted as author of the genera which Hübner indicated.

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[I am rejoiced to find that, in the above communication, Mr. Butler has dealt with the proposed renaming of the old divisions of the genus *Acronycta* by Dr. Chapman: not having lately been paying much attention to the Heterocera, I could not take the matter up in a satisfactory manner. I felt that the suppression of the name *Acronycta* could not be justified, as it was at variance with all the canons of zoological nomenclature. With regard to the proper spelling of the name, Acron*i*cta, as used by Ochsenheimer, was an error, and was early corrected to Acron*y*cta, in accordance with the spelling of the Greek words from which the name is derived.—J. J. Weir.]

ON THE SO-CALLED "*ERASTRIA*" *VENUSTULA* OF EUROPE.

By A. G. Butler, F.L.S., &c.

In Lederer's revision of the European Noctuæ, which forms the basis of the classification adopted by Staudinger in his Catalogue, *E. venustula* is unhesitatingly referred to *Erastria*. When re-arranging the collection here, I was struck by the dissimilarity from the other forms which this species offered, and, upon examination with an ordinary pocket lens, I at once discovered characters which separate it widely from *Erastria*.

Typical species of *Erastria* (I ignore the Tentamen of Hübner, the publication of which was never proved, and therefore take *E. fasciana*, Linn. = *fuscula*, Schiff., as type) are characterised by a more or less tufted abdomen, although in *E. candidula* the basal tuft alone remains; by porrected palpi with well-exposed terminal joint, and by the radial of the secondaries being emitted just beyond the third median branch, as in *Acontia* and all the genera of the later groups of *Noctuites*.

Lederer's arrangement is very faulty, inasmuch as the species of his group A, characterized by species not having a tufted abdomen, are not typical; moreover *E. candidula*, as already stated, has a tuft on the basal segment of the abdomen, and is also closely related to the North American *E. carneola*, in which the abdomen is very heavily tufted; with the exception of *E. scitula*, which differs in having the second and third median branches of the secondaries emitted from a footstalk, and therefore is not an *Erastria*, and *E. candidula*, which is an *Erastria*, none of the species even resemble the genus.

With regard to *E. venustula*, it has an untufted abdomen, thick upright palpi, with very short terminal joint, and the radial of the secondaries emitted from the centre of the disco-cellular veinlet—a character which at once removes it to the earlier groups of *Noctuites*. According to Lederer the larva would appear to be a semi-looper, and, if this is so, it would be best to place it at the end of the first section immediately preceding the *Eriopidæ*: but I question Lederer's having personally examined the larva, and I should like to know from Mr. Cooper, who has had opportunities of rearing it, whether it at all nearly resembles the larvæ of the species with which it has been wrongly associated.

It now becomes necessary to assign *E. venustula* to a different genus.

In his 'Verzeichniss,' Hübner, at p. 254, included the following species in his genus *Hapalotis*:—*H. furvula*, now referred to *Caradrina*; *H. lupula* and *ravula*, referred to *Bryophila*; *H. fuscula*, *atratula*, and *candidula*, referred to *Erastria*; lastly, *H. venustula*, which, by the process of restriction now adopted for fixing the types of these mixed genera, becomes the type of

Hapalotis. I prefer to adopt Hübner's name, rather than to propose a new one; and those who object to quoting the genus as Hübner's, on the insufficient ground that it is imperfectly characterised, are welcome, so far as I am concerned, to imagine that I am the author of it.

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CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. Perry Coste, F.C.S., F.L.S.

(Continued from p. 91.)

V.—The Chemical Aspect (*continued*).

H.

The next colour which we have to consider is green; a very interesting colour, but an exceedingly difficult and perplexing one to deal with. The difficulty is owing to the fact that under the one term of green are included several different colours—different in constitution and behaviour, though broadly similar in appearance. This was already evident from the reactions tabulated on page 251 of the last volume; but since then I have been able to experiment on a number of exotic species, with the result that I have discovered still more variability in the greens. Clearly, then, our first step must be to classify these various greens, and, as a preliminary, I will prefix a list of the fresh specimens recently examined, with a summary of their reactions.

Name.	Colour.	Acid effect.	Alkali effect.
Papilio codrus	Leaf-green	O	Yellow
P. agamemnon	Deep green	O (except by HNO_3)	Whitish
P. policenes	Leaf-green	White	White
P. antheus	Pale green	White	Somewhat affected
Limenitis procris	Sage-green	Dun-grey	Dun-grey
Parthenos gambrisius, below	Sage-green	Dun-brown	Dun-brown
Parthenos gambrisius, above	Metallic green	Purplish bronze	Blackish
Eronia argia	Very pale bluish grn	White*	White
Hesperia sp.?	Dark metallic green	Blackish or O	Purplish bronze
Urania fulgens	Metallic bronze-grn	Red or violet bronze	

Let us, first of all, adopt the same course that was followed in treating of yellow and chestnut, and arrange the various greens in different groups, according as they behave when tested with the reagents. We shall find it necessary to form—at least provisionally—three groups, as shown in the following tabulation :—

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* Dissolution not certain; so little pigment in the wing to start with.

Physical colours. Became bronze.	Physical (?). Became bronze-brown, &c.	Pigment colours. Dissolve, leaving white wing; but, in some cases, wing is *yellowed.*
Parthenos gambrisius, above *Hesperia* sp.? *Urania fulgens*	*Argynnis* *Limenitis procris* *Parthenos gambrisius,* below *Ino statices* *I. globulariæ* *Thecla rubi*	*Papilio codrus* *P. agamemnon* *P. policines* *P. antheus* (*Eronia argia*) *Halias prasinana* *Moma orion* *Dichonia aprilina* *Larentia viridaria* *Nemoria vernaria* *Hemithea strigata* *Metrocampa margaritaria* *Tortrix viridana* *Cidaria miata* } (?) *C. psittacata* }

It may be noticed that in this table I have ignored one species, *E. cardamines*, the green of which, as shown in my original tables,* is invariably turned black by all reagents. The omission here of so unique a species may cause surprise; and, indeed, were the colour of this really a true green, which green becomes black by the action of my reagents, we should certainly have a most interesting example to deal with. But, as a matter of fact, the green of this species cannot be rightly reckoned as green at all. My experiments have fully convinced me that Mr. Cockerell was quite right in the statement made some time since, in his article on Variation,† that the green of *cardamines* is apparent only, being merely a mixture of black and yellow. This entirely accords with my experiments: the slight amount of yellow is rapidly dissolved and the black left standing only. Therefore, although this wing, previously to all appearance green, remains black, we cannot reckon that a green has been changed to black.

Now, in discussing the character of green, the first point to be noticed is that whereas in red we had indubitably a pigment colour only, and in yellow and chestnut (yellow especially) had no *certain* evidence of any "physical colour," here, in green, on the contrary, we have indubitably *both* physical and pigmental colours to deal with, as well as a class of colours that are very probably physical, though it is scarcely possible to speak decidedly about them at present.

Let us first dispose of the physical greens, of which we have, undoubtedly, examples in *Urania fulgens*, *Parthenos gambrisius*, and the *Hesperia* sp. All of these are *metallic* colours, and, by a practised eye, can be instantly and with certainty detected as "*physical*" colours. I think that I may safely venture to lay down the rule that when a patch of colour visibly consists not of a *continuous* mass, but of a number of isolated distinct spots of colour, that colour is certainly *physical*. So far as my experience goes, this kind of appearance is found only in the metallic greens* and the blues; among the latter *Papilio machaon* affords an excellent illustration. I hope that my description of the kind of effect to which I wish to draw attention is intelligible; but if not, I will ask any of my readers to carefully examine the blue markings on *P. machaon*, after doing which I think that they will no longer be under any doubt.

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* Entom. xxiii. 252.

† Entom. xxii.

Now, as to the reactions of such "physical" blues and greens, it must not be hastily assumed that because such colours are not pigmental, therefore they will be totally unaffected by any reagents. This would be erroneous. Of course there can be no dissolution effect, neither can there be any "reversible" effect, such as the reds display. But it must be remembered that, since the colour in such cases depends on the molecular structure of the surface, any temporary or permanent alteration of this surface may be expected to temporarily or permanently alter the colour. It would be strange indeed, if a thorough soaking with even any indifferent liquid did not temporarily affect the molecular structure, and so alter its effect on the light rays; much more might we anticipate that any such powerful and destructive reagents as caustic potash, or nitric acid, would permanently alter the surface structure, and so lead to a coloric alteration. And this is just what we do find in many cases, as will more clearly appear after the phenomena of blue species have been discussed. Accordingly, one of three things may happen when we experiment on these "physical" colours:—(1) They may be unaffected; or (2) the colour may disappear, but gradually return on drying;† or (3) the colour may be permanently either altered to, usually, another metallic-looking colour, or permanently dulled or destroyed.

Returning now to the three green species just referred to (*U. fulgens*, *P. gambrisius*, and the *Hesperia*), we find that the greens are changed to some sort of a *bronze*—a reaction which is perfectly intelligible in the case of a physical colour. Since further examples of such changes will be found among the blues, we need linger no longer to consider them here; but I may observe that the green of *Parthenos gambrisius* (upper surface) suffered unusually for a colour of this class, since the final effect of most of the reagents was to destroy all lustre and colour altogether, and I found no return after several days' standing. The "physical" greens seems to possess by no means so "strong a constitution" as the physical blues.

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* I ought, however, to add, that with some of these metallic colours it is a toss up whether to call them green or yellow; all depends on the angle at which the light falls on them.

† This is very marked in *P. machaon*.

In column 2 we have an exceedingly interesting and equally puzzling group—one, too, that has caused me not a little mental exercitation. Originally, I had split this into two groups, the second of which possessed one solitary representative, *T. rubi;* but further reflection and experiment have led me to class *T. rubi* with the other species, as in the present arrangement. The difficulty with this group is to obtain some decided evidence that shall justify us in stating certainly that these greens are or are not "physical" colours. The facts that I have found no solution of pigment (indeed, the change from green to brown is so instantaneous as to well nigh preclude any supposition of solution taking place), and have no evidence of a "reversible" effect comparable with that in the case of red, both tell against the existence of a green pigment in these instances. But this evidence is not conclusive. Considerably more conclusive is the fact that in *Limenitis procris* I have been able to effect the change from green to brown (or rather, in this case, a sort of dun-grey) by simple water; and this change was permanent. In *T. rubi*, too, it is possible to abolish the green colour by water; but the colour rapidly returns. In *Argynnis* I have been less successful in inducing this change by water only; but in both these two last species I have effected it by alcohol. In the case of *rubi* the green returned very quickly, as soon as the wing was dried in fact. In *Argynnis* the return was less rapid. I must point out that the argument from the action of alcohol must be applied with considerable reservation.

Summing up the case of group 2, it seems to me that we may lay down the following conclusions:—That the green of *Parthenos gambrisius* is physical; this is strongly supported by the undoubtedly physical character of the green on the upper surface of that species. The similar green of *Limenitis procris*[*] is also physical; and the green of *Ino statices* and *globularia* is, in all probability, of the same nature. As to *T. rubi* and the *Argynnis* species, the evidence is strongly in favour of the former being of a physical green; while as to the latter, the evidence, so far as it goes, favours the same supposition, but is less strong perhaps.[†]

Turning now to group 3,—the most interesting of all, since here we have clearly pigment colours in evidence,—we shall find a brief notice, in addition to the facts published already in the tables,[‡] sufficient. Taking, first, the English species, which in all cases, except the ambiguous one of *Cidaria miata* and *psittacata*, dissolve, leaving a white wing, the case is evidently exactly comparable, so far, with the behaviour of the soluble yellows and chestnuts; and it is exceedingly interesting that we should find the *same* green pigment in such very divergent groups as Noctuæ, Geometræ, and Tortrices; whilst the evidence of the exotic Papilionidæ extends this statement to the Rhopalocera. As to the case of *Cidaria*, I am inclined to think it not impossible (though I am not sure about this point) that the exception may be no more real than is the behaviour of *Vanessa io* among the chestnuts; I mean that the green of *Cidaria* may be identical with that of the remaining species, but developed *on* a grey or brown ground wing instead of on a white.* If this supposition be correct, these two species are of especial interest.

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[*] This derives additional support from the fact that in *L. sibylla* we have this colour represented by a physical pale blue. See next subsection.

[†] I shall be greatly obliged to any correspondents who will inform me, either by letter or through the pages of the 'Entomologist,' of any species marked with apparently the same green as *rubi* or *argynnis;* and also of any varieties (if any such be known) of these species—varieties, I mean, so far as concerns the green.

[‡] Entom. xxiii. 252.

Now, any reader who will turn to the original tables of reactions,† published last August, will observe that in the case of *Halias prasinana* I especially emphasised the somewhat startling phenomenon that one reagent (ammonia) turned the green to a *prominent yellow;* not a pale, dubious yellow, but a genuine "ochre-yellow." This phenomenon is not, moreover, entirely so isolated as might appear at first sight; for in the case both of *M. orion* and *D. aprilina* a faint yellowish tint was produced by nitric acid. Neither are parallel instances wanting among the Geometræ; for in both *H. strigata* and *M. margaritaria* a yellowish tint was produced, whilst it is noted that *N. vernaria*, under the influence of acetic acid, changed from green to white, "passing through a phase with pale yellow streak."

Turn we now for a moment to the Papilionidæ. When I first saw the beautiful leaf-green of *P. codrus*, *agamemnon*, &c., I concluded it pretty certainly to be a pigment colour. But the earlier experiments did not seem to bear out this view: for instance, both these species were unaffected by the acids; but the other two species noted were more amenable; and in all cases the greens were acted on by potassic and sodic hydrates.‡ I concluded, therefore, that the green was identical with that of our English Heterocera, already referred to, although of a somewhat more stable or less soluble character. But there is yet stronger evidence; for, as shown above, the effect of the alkalis was to change the green of *codrus* into a *yellow*, which was permanent when looked at five days afterwards. In the case, too, of *policenes*, although the wing was not yellowed, yet the solution of the dissolved pigment was; or, to quote the entry made in my note-book, it "dissolved as yellowish." We may, therefore, very safely consider, I think, that the Papilionidæ green is practically the same as that of the other species.

Now let us revert to the "yellowing" phenomenon: how is this to be interpreted? The facts, so far as they go, appear to me to point very significantly to one conclusion, that *green has been evolved from yellow* similarly as red has. I am, however, anxious not to insist upon this interpretation at present, since the data to hand are far too scanty for a definite decision to be made; but it is certainly justifiable to point out the probability of this view. For the rest, I can only wait until, by experimenting on a large number of green species, further data shall have been accumulated. I may add that, in forming this opinion as to the relations of green and yellow, I have relied not simply upon the fact that in several cases green has been changed into a permanent yellow, but also, especially, on the apparent evidence afforded by various species of yellow being a transition stage in the course of the dissolution; just as, for example, the red of *Delias* and the orange-red of *G. cleopatra* are first changed to yellow, and then that yellow dissolved.

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* Entom. xxiii. 340.

† Entom. xxiii. 252.

‡ With this *cf.* the fact that chestnut seems in many cases more soluble in alkalis than in acids.

This much must serve for green; and now we pass to the last colour to be considered, *viz.*, blue.

(To be continued).

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 97).

ADDITIONAL records have been obtained from the following sources:—

(23.) Rev. J. E. Tarbat. A MS. list of Lepidoptera taken mostly at Brook Green, Hammersmith, between the years 1881 to 1883 inclusive.

(24.) A. W. Mera. A MS. list of Lepidoptera taken in Middlesex, chiefly between the years 1862 and 1879.

(25.) Canon Fowler. 'Coleoptera of the British Islands.' Records quoted from this work are for the most part credited to its author, as the name of the collector is not often mentioned therein. It would be better, no doubt, to quote the original sources of information from which Canon Fowler got his records, most of which have probably been published before; but this would involve more bibliographical research than the present recorder has time for.

Two additions are so interesting that they may be noticed now. Mr. Mera gives me records of *Leucophasia sinapis*, L., "in a lane near Acton, one specimen taken by a friend"; and *Stauropus fagi*, L., one taken in his garden at Hammersmith about 1863. Additional records for several of the rare species have also been received, and will be published later on.

It has happened not unfrequently that the same locality for a species has been sent to me by two observers: in such cases I have usually only quoted the name of one of them. In Entom. 1888, pp. 247, 248, Mr. J. W. Tutt records several species and varieties of Noctuæ from "London." These are omitted from the present list, as I learn from Mr. Tutt that the records refer to parts of London outside Middlesex.

LEPIDOPTERA.

Noctuidæ, subf. *Bryophilinæ*.*

Bryophila perla, Fb., Hall Road, St. John's Wood; Kingsbury; Harrow Road, Willesden (*Godwin*); Mill Hill, at sugar (*South*); Isleworth (*Fenn*); Bedford Park (*L. M. Cockerell*); Highgate (*Shepherd*); frequent on walls about South Hampstead (*Watts*); Hammersmith (*Tarbat*).

Subf. *Bombycoinæ*.

Demas coryli, L., Oxhey Lane (*Rowland-Brown*).

Acronycta psi, L.,† Regent's Park; St. John's Wood (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Ealing (*Ckll.*); Bedford Park (*Miss E. Sharpe*); Highgate (*Shepherd*); Hammersmith (*Mera*); common, larvæ or birch (*Watts*); Chiswick, larvæ on fruit trees, including medlar and quince (*Sich*); Bayswater (*Chitty*); Clapton (*Bacot*); Dalston (*Prout*). *A. tridens*, Schiff., Highgate (*Shepherd*). *A. leporina*, L., larvæ beaten from birch at Bishop's Wood, Hampstead (*Godwin*); S. Kensington (*Pratt*). *A. aceris*, L., Regent's Park; St. John's Wood (*Godwin*); Mill Hill, at rest on ash (*South*); Bedford Park, a larva in Woodstock Road (*Ckll.*); Highgate (*Shepherd*); Hammersmith (*Mera*); Hampstead, larvæ on sycamore (*Watts*); Chiswick, at rest on trunk of apple tree, larva on palings near horse-chestnut trees, pupa on trunk of same (*Sich*); Clapton (*Bacot*); Dalston (*Prout*); S. Kensington (*Pratt*). *A. megacephala*, Fb., Regent's Park; St. John's Wood (*Godwin*); Mill Hill (*South*); Bedford Park, larva on poplar (*Ckll.*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Chiswick, larva on poplar and willow (*Sich*); South Kensington (*Chitty*); Clapton (*Bacot*); Dalston (*Prout*). *A. alni*, L., doubtfully quoted from Bishop's Wood (*Godwin*). *A. rumicis*, L., Hampstead, *olim* (*Godwin*); Mill Hill, at sugar (*South*).

Diloba cæruleocephala, L., generally distributed (*Godwin*); Mill Hill, larvæ very common on hedges (*South*); Old Oak Common (*Mera*); Harefield (*Wall*).

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* Probably the arrangement of the Noctuid moths usually adopted in this country will need modification. I here reduce most of our "families" to subfamilies, which is certainly the highest rank they deserve. Grote, in his recent check-list, treats similar divisions merely as tribes.

† Dr. Chapman has, I think with sufficient reason, split *Acronycta* into three genera or subgenera (Ent. Rec. 1890), but, as I learn from Mr. Butler, the names he has proposed for them will not any of them stand as valid.

Subf. *Leucaniinæ*.[*]

Leucania[†] *conigera*, Fb., Clutterhouse Lane; Cricklewood; Hampstead; Old Oak Common (*Godwin*); Mill Hill (*South*); Harefield (*Wall*). *L. conigera* ab. β, Tutt, Clatter House Lane (Entom. 1878, p. 169). *L. vitellina*, Hb., Finchley (*W. T. Sturt*, Ent. Mo. Mag. xxiii. p. 110). *L. lithargyria*, Esp., Clutterhouse Lane; Hampstead; Old Oak Common (*Godwin*); Mill Hill, at sugar and bred from larvæ (*South*); Highgate (*Shepherd*); Chiswick (*Sich*); Harefield (*Wall*). *L. comma*, L., Mill Hill (*South*); Harefield, frequent (*Wall*). *L. straminea*, Tr., Hammersmith, *olim* (*Newman*, 'Brit. Moths,' p. 266). *L. impura*, Hb., Clutterhouse Lane; Hampstead; Old Oak Common (*Godwin*); Mill Hill (*South*); Bedford Park (*J. W. Horsley* fide *Fenn*); Finchley (*Shepherd*); Harefield (*Wall*); Clapton (*Bacot*). *L. pallens*, L., Clutterhouse Lane; Hampstead; Old Oak Common (*Godwin*); Mill Hill (*South*); Finchley (*Shepherd*); Harefield (*Wall*).

Senta maritima, Tausch.

Tapinostola fulva, Hb., Bishop's Wood, Hampstead (*Godwin*).

Nonagria arundinis, Fb., Willesden; Old Oak Common; Hampstead Heath; Hammersmith (*Godwin*); Mill Hill, at sugar (*South*). *N. geminipuncta*, Hatch.,[‡] Hammersmith Marshes (*Newman*); *N. lutosa*, Hb.,[§] Hammersmith (*Mera*).

(To be continued.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

South London Entomological and Natural History Society.—The Annual Exhibition of this Society, held on the 15th and 16th of April last, was an undoubted success. The general arrangements were excellent, and the exhibits were very pleasingly varied, and represented all branches of Natural History. Among other important exhibits in the Entomological Section was one, by Mr. Billups, of Ichneumonidæ bred by members of the Society from various species of Lepidoptera during the past four years. In all cases the imago of the lepidopteron upon whose larva the ichneumon was parasitic was shown, and in many instances the larva also. Mr. Leech's contribution, which showed the geographical distribution and local variation of several species of Lepidoptera found in Britain, attracted considerable attention, as also did Mr. Adkin's geographical arrangement of British butterflies, and his very fine collection of *Triphænæ*. Another specially interesting exhibit was the collection of Canadian Lepidoptera presented to the Society by Messrs. A. and L. Gibb, and arranged by Mr. W. West, the curator. There were several instructive cases of life-histories of Lepidoptera, lent by Messrs. Croker, McArthur, Quail, &c.; and of insects injurious to farm crops, by Mr. S. L. Mosley. The variation of Lepidoptera in Britain was illustrated by several exhibitors, among whom were Messrs. C. S. Gregson, T. W. Hall, J. W. Tutt, and S. Webb; some of the aberrations of *Vanessa urticæ* and *Abraxas grossulariata*, shown by the last-named gentleman, were extraordinary, as also was a black specimen of *Papilio machaon* exhibited by Mr. Leech. Examples of mimicry among Lepidoptera were exhibited by Prof. Stuart. Mr. R. McLachlan exhibited British Trichoptera (caddis-flies), with larval cases. Homoptera were shown by Messrs. Billups and West, and there were loans of Coleoptera from Messrs. C. H. Goodman, W. Manger, G. A. Lewcock, and others. Three lantern exhibitions were given on each evening; and Mr. F. Enock's lecture on "The Wonders of Insect Life," illustrated by micro-photo-slides, was an intellectual treat thoroughly enjoyed by all.—Ed.

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[*] This subfamily is equivalent to Grote's tribe Nonagriini.

[†] Mr. Grote uses the older name *Heliophila*, Hbn., in place of *Leucania*.

[‡] *N. geminipuncta* is said by Mr. Butler to be congeneric with *Tapinostola fulva*.

[§] N. (or *Calamia*) *lutosa* and *N. arundinis* are referred by Mr. Butler to *Ommatostola*, Grote.

Coccinellidæ eaten by Black-headed Gulls.—On several occasions, during the last three years, I have frequently seen a number of black-headed gulls flying about over the tops of some tall trees in a small plantation near the river Mersey. They attracted my attention more especially by their curious flight, which was very like that of a company of swallows chasing their prey; by this I guessed that they were capturing insects on the wing, but to be quite sure of this, one of the birds was shot, and as it fell to the ground it became suspended by its legs to the lower branches of a tree, when it immediately cast up a number of specimens of a *Coccinella*, numbering between thirty and forty individuals. In company with the gulls there were frequently a number of starlings, also flying as if chasing insects, but whether they were feeding upon Coccinellidæ or not I am unable to state, as I have not examined their stomachs. The gulls only frequent this spot on sunshiny days during flood-tide, apparently for the purpose of obtaining insects and nothing more. It is very curious that the Coccinellidæ should fly so high, and much more so for the gulls to feed upon them; they are the last birds that one would suspect of doing this. I regret that I am unable to give the name of the *Coccinella*, as at the time I attached no special value to my observation, but since reading my son's note (*ante* p. 100), I thought this might prove of interest.—R. Newstead, Sen.; Ince, near Chester, April 9, 1891.

Birds feeding on Nauseous Insects.—In 1875 a large whitethorn hedge between Shoreham and Lancing was being devoured by larvæ of *Liparis chrysorrhœa*. Four cuckoos that were flying in and out of the hedge fell to the gun of Mr. F. Trangmar. Thinking the birds had been feeding on the larvæ, we examined the contents of their stomachs; but although we could find no trace of larvæ amongst the almost completely digested matter, we observed the remains of several wing-cases of different Coleoptera, and I distinctly remember finding, in two of the birds, elytra of the common ladybird.—H. McArthur; 35, Averill Street, Fulham Palace Road, W.

An Entomological Myth.—In all our lists of British Lepidoptera occurs the name of *Cucullia scrophulariæ*, Hüb. It has been recorded from Bloxworth, but the Rev. O. P. Cambridge now writes, "I doubt whether my Bloxworth examples are any more than *C. verbasci*." I believe myself that there is no such species in Britain, and that specimens of both *C. verbasci* and *C. lychnitis* are doing duty in our cabinets as *C. scrophulariæ*. If we turn to the 'Lepidoptera Britannica,' we see that Haworth's opinion is this:—"As the great lepidopterist Hübner gives the water-betony moth as a distinct species from that of the mullein, and figures both, it is also here enumerated, as I possess English specimens of both and have seen others. But, unless they differ more in the larva state than they do in the winged, which is almost a constant characteristic in this section, I must still conceive they are not distinct, but very slight variations only. The chief difference is the paler colour of *scrophulariæ*, whose upper wings, especially in the broad plaga, are of an ochreous colour, as figured by Hübner, while those of *verbasci* are nearly white in the same part." Now, may I ask, will not this description do for *C. lychnitis*, Ramb., which species was apparently unknown to Haworth? A mistake which has often been made is that larvæ of a *Cucullia*, feeding on figwort, are those of *scrophulariæ;* for it must be borne in mind that the larvæ of *verbasci* will also feed on figwort as well as on mullein. Stainton, in his 'Manual,' gives a description of the larva of *scrophulariæ*, copied from Rambur. May I ask, Has any such larva been found in Britain?—C. W. DALE; Glanvilles Wootton, March 20, 1891.

ASSEMBLING OF BREPHOS PARTHENIAS. — In answer to Mr. Perry Coste's enquiry with regard to assembling, it may be interesting to record my experiences of to-day. At 2 p.m., the afternoon being warm and sunny, I armed myself with the three bottom joints of a good stout fishing-rod, and wended my way to some woods at Warley where I take *B. parthenias* regularly every year. On arriving at the scene of operations, I affixed my net to the fishing-rod, which was some ten feet high, and wandered about in search of the orange underwing. For a long time I was unsuccessful, as the wind was rather high, my net unwieldy, and there were very few *parthenias* about. At last I succeeded in catching a male flying low, and shortly afterwards a large, dark, freshly emerged female, flying about five feet from the ground round a birch bush. No sooner was she in my net than all at once she was surrounded by five males, which seemed to rise as if by magic from two neighbouring birch trees. Three of these were promptly in my net and soon transferred to boxes. The female I left in my net, hoisted on high, and for a considerable time afterwards males kept coming up, both with the wind and against it. The would-be captor of *parthenias* should select a clearing in a birch-wood, where he will have plenty of room to make the somewhat wild strokes necessary to catch this high-flying species. Fresh specimens rarely fly at a lower altitude than ten or twelve feet.—(Rev.) GILBERT H. RAYNOR; Victoria House, Brentwood, April 6, 1891.

ATTACUS ATLAS (GIANT RACE).—I wish to record my success in rearing one of these somewhat delicate insects through all its stages—a success which culminated in the emergence, a few days ago, of a fine female imago, measuring within a shade of ten inches across. Of the three larvæ which hatched from the half-dozen ova that I obtained last summer, one died on arrival, having hatched in the post; another died after attaining about half its growth; but the third resulted in the above-mentioned success. The larvæ selected oak for their food during their first and a considerable portion of their second stage, but subsequently, until the death of one and and pupation of the other, plum alone was eaten. They were kept under a glass shade in a hothouse, but there was practically no artificial heat except a moderate temperature at night. The larva that attained its full growth fed almost continuously, and this, coupled with the size of one of the parents, led me to expect even a larger imago. Seven weeks was about the duration of the larva stage, and it took about a similar period to "force" the pupa; *Attacus orizaba*, under the same conditions, taking two weeks less.—H. J. White; Frogmore Lodge, St. Albans.

Hybernia defoliaria in February.—During the first week of last February, I met with eight specimens of the above insect, at gas lamps. Contrary to Mr. Raynor's experience (Entom. 99), nearly all these were in fine condition (though curiously undersized), and I can hardly believe that they were other than freshly emerged specimens, and not hybernated ones from the previous October or November. Though working the gas lamps frequently the previous autumn, I only record three examples of this species. As an instance of the wide time-range of emergence that obtains in the genus *Hybernia*, I may mention that *H. progemmaria* abounded at the gas-lamps here at the end of January and during February of last year, and that on April 17th of the same year, I netted a specimen of this species near Dawlish, S. Devon.—R. M. Prideaux; 28, Berkeley Square, Bristol, April 3, 1891.

I venture to think that the specimens of this moth taken by the Rev. Gilbert H. Raynor, in February last, were insects the emergence of which from the pupa was retarded by the long frost which set in at the end of last year. This was certainly the case with a male of this species which I found in my breeding cage in the beginning of February, and probably also with a female, but as the latter was dead when found, it might have emerged in November and escaped my notice, though I think this unlikely. Mr. T. B. Jefferys' note (Entom. 100) on *Pœcilocampa populi* supports my view. Even winter insects require a warm day to induce them to leave the pupa.—A. J. Chitty; 33, Queen's Gate Gardens, S.W.

Late appearance of Hybernia defoliaria.—I took a few larvæ of this species last year; two or three imagines came out at the usual time, and I was much surprised to find that a male came out on 28th December. I thought this was very late for the species, but another male (dark variety) came out on 30th January; a female on the 3rd February; and a male (dark variety) on 13th February. My breeding-cage is situated out of doors, but sheltered from the north and north-east winds, and it gets the benefit of whatever sunshine there may be.—A. Bacot; 35, Oakfield Road, Clapton, N.E., April 9, 1891.

Hybernated specimen of Geotrupes typhæus near Manchester.—While hunting for Coleoptera on the 27th of last month, in Dunham Park, Bowdon, near this city, I turned out of a bore a fine hybernating specimen of *Geotrupes typhæus*. According to Mr. Fowler's work, 'Descriptive British Coleoptera,' Dunham Park is, with the exception of Liverpool, the only place in the northern counties where this species has been observed, although found locally in southern counties. Perhaps this note may interest some northern entomologists. — Wm. McKay; 79, Bishop Street, Moss Side, Manchester, April, 1891.

Notes on some early species of Lepidoptera. — Since the first of the month of March I have been several times to Richmond Park, to obtain *Nyssia hispidaria*, but have not been fortunate enough to meet with it, and to the present time I have only heard of about eight having been taken. *Phigalia pedaria*, *Hybernia leucophearia*, *Anisopteryx æscularia*, occurred sparingly on the days when I was able to visit the park, but several friends have taken all three species there commonly since the end of February. On the 15th March, *Tæniocampa gothica* began to emerge, in a cage that has been in the garden during the whole of the winter; the pupæ were then brought into a warm room, and since then have emerged very freely, averaging about half a dozen a day. I am also breeding *Eupithecia minutata*, *Lobophora viretata*, and *Hemerophila abruptaria*, all of which have been kept in a room where there is a fire every day.—H. W. Barker; 83, Brayard's Road, Peckham, S.E., March 25, 1891.

Notes from the Wye Valley below Builth.—I found the year 1890, on the whole, a very bad one for Lepidoptera. I, however, succeeded in adding some moths to the list I am making of the Lepidoptera of this neighbourhood. On the 22nd of May I took at light two beautiful specimens of *Agrotis cinerea*, which is, I believe, considered a good insect anywhere, and one I hardly expected to get here, as I can hear of no other instance of its capture anywhere in the district. In August I took also at light *Cleora glabraria*. I found sugar almost a complete failure, and took very few moths at it. Larvæ in the spring and early summer were very plentiful on the oaks, but in the autumn they were singularly scarce. Butterflies were much fewer than usual, the commonest were, I think, *Polyommatus phlæas* and *Lycæna icarus*. The Vanessidæ were, on the contrary, very scarce. I hardly saw a specimen of *V. atalanta* or *V. io*, and not a single *V. cardui*, all of which, especially the first two, are generally very common here.—John Williams Vaughan, Jun.; The Skreen, Radnorshire, Erwood, R.S.O.

Late appearance of Euchloë cardamines.—On various occasions notes have appeared in the 'Entomologist' of unusually late appearances of *Euchloë cardamines*. It may, therefore, be of interest to state that I saw a specimen (male) on July 15th last, at Mürren, near Lauterbrunn in Switzerland. It may possibly be worth recording, also, that during a tour of between two and three weeks, in which time I walked over between 200 and 300 miles of that country, I saw but one specimen of *Gonopteryx rhamni*, and that between Thun and Interlaken.—F. H. Perry Coste; Ravenshoe, Burnt Ash, March 4, 1891.

Pieris rapæ.—On the 24th March last, a freshly emerged specimen of *Pieris rapæ* was taken in the kitchen at the Bridge House Hotel, London. Although this date is late as compared with the recently recorded specimens (Entom. xxiv. 77, 99), the position in which the insect was found appears to me to afford a clue to their origin. What is more probable than that the larva from which this butterfly was reared should have been introduced into the kitchen in the autumn with the cabbages that would, in the ordinary course of things, be brought into such a place for culinary purposes, and being full fed seek some secluded corner in which to pupate; and its premature emergence be brought about by the warmth of the apartment? In like manner, larvæ that may have wandered into greenhouses to undergo pupation would, by reason of the artificial warmth applied in the early months of the year to force the plants into blossom, be also forced into early emergence, and on the first opportunity escape into the open. —Robt. Adkin; Lewisham.

Eupithecia albipunctata var. angelicata.—I have bred a number of this variety of *E. albipunctata*, along with the type, from larvæ taken at Bishop's Wood last September. Some years ago I bred one or two a season, but never in such large proportion to the type as this year.—Geo. Jackson; York, April 21, 1891.

Cloantha solidaginis in Inverness-shire.—Among the few specimens taken by me last season in Inverness-shire (Entom. 74), I omitted one specimen of *Cloantha solidaginis*, which at the time I had noted down as *Acronycta menyanthidis*; not, however, being sure of this, I sent my capture to Mr. Tutt, who kindly identified it for me. Newman says of this species, "Exceedingly local; once taken at Torquay, its favourite counties being Lancashire, Cheshire, and Yorkshire."—D. H. S. Steuart; Royal College of Science, Kensington, W., April 9, 1891.

"A Cold Prospect."—Under this head the 'Chester Courant' for April 1st, 1891, has the following, which may be interesting to entomologists:—"Many people have an idea that after the severe winter we have had we may look for a warm summer, but according to M. Lancaster, of the Brussels Observatory, who has been engaged in studying the statistics of the weather in Europe during the present century, a cold winter has never in that period been followed by a hot summer. On the contrary, in most cases the ensuing summer has been colder than usual." So far the entomological outlook—in the Chester district at any rate—is a poor one, and coincides too closely with the dismal forebodings of the quoted paragraph. March has been exceptionally cold, and April is, so far, both cold and sunless. Amongst preponderating east winds, my notes very naturally record very little Entomology.—J. Arkle; Chester, April 8, 1891.

SOCIETIES.

Entomological Society of London.—*April 1st*, 1891.—Professor R. Meldola, F.R.S., Vice-President, in the chair. Mr. G. A. Booth, of Grange-over-Sands, North Lancashire; and Mr. W. Manger, of New Cross, S.E., were elected Fellows of the Society. Capt. H. J. Elwes showed a small but very interesting collection of butterflies from Laggan Alberta, N.W. Territory of Canada, taken by Mr. Bean at high elevations in the Rocky Mountains. Amongst them was *Colias elis*, Streck., which seemed to be very close to, if not identical with, *C. hecla* of Europe; *Argynnis alberta*, W. H. Edw.; and *Chionobas subhyalina*, W. H. Edw. The resemblance between the butterflies of this locality and those found on the Fells of Lapland was very striking, some of the species being identical, and others very closely allied. Capt. Elwes said that it was another proof, if one were wanted, of the uniformity of the butterflies found throughout the boreal region in the Old and New Worlds. Mr. G. C. Champion exhibited several insects recently received from Mr. J. J. Walker, from Hobart, Tasmania. The collection included a curious species of Forficulidæ, with asymmetrical forceps, from the summit of Mount Wellington; two mimetic species of Œdemeridæ belonging to the genus *Pseudolycus*, Guér., and the corresponding Lycidæ, which were found with them; also specimens of both sexes of *Lamprima rutilans*, Er. Mr. N. M. Richardson exhibited a specimen of *Zygæna filipendulæ* with five wings; a second specimen of the same species with the middle legs on the right side much dwarfed; four specimens of *Gelechia ocellatella*, including a pink variety, bred from *Beta maritima*; four specimens of *Tinea subtilella*, a species new to Britain, taken last August in the Isle of Portland; also specimens of *Nepticula auromarginella*, a species new to Britain, bred from larvæ taken near Weymouth on bramble. Dr. Sharp and Mr. M'Lachlan commented on the structural peculiarities of the two specimens of *Zygæna*. Mr. C. Fenn exhibited a long series of *Tæniocampa incerta*; they were all bred from ova laid by the same female, and many of them were of an abnormally pale colour. Mr. Fenn said that, according to Mr. Merrifield's theory, these pale specimens, in consequence of the temperature to which they had been subjected in the pupal state, ought to have been very dark. Mr. Jenner Weir, referring to the pale specimens, said he had never before seen any of so light a colour. Mr. W. Dannatt exhibited a butterfly belonging to the genus *Crenis*, recently received from the Lower Congo. He said he believed the species was *Crenis benguelæ*. Mr. G. A. J. Rothney sent for exhibition several specimens of an ant (*Sima rufo-nigra*), from Bengal, together with specimens of a small sand-wasp (*Rhinopsis ruficornis*) and a spider (*Salticus*), both of which closely mimicked the ant. It was stated that all the specimens exhibited had lately been received from Mr. R. C. Wroughton, Conservator of Forests, Poona. Mr. Rothney also communicated a short paper on the subject of these ants and the mimicking sand-wasps and spiders, entitled "Further notes on Indian Ants." Mr. G. C. Champion read a paper entitled "A list of the Heteromerous Coleoptera collected by Mr. J. J. Walker, R.N., in the neighbourhood of Gibraltar, with descriptions of four new species." At the conclusion of the meeting a discussion ensued, in which Mr. Kirby, Capt. Elwes, Mr. M'Lachlan, Mr. Jenner Weir, Dr. Sharp, and Mr. Crowley took part.—H. Goss, *Hon. Sec.*

THE SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY. —*March 26th*, 1891. Mr. W. H. Tugwell, President, in the chair. Mr. Skinner, of Putney, was elected a member. Mr. C. Fenn exhibited a long series of *Tæniocampa incerta*, Hufn., bred from ova obtained from a female captured at Lee, Kent, and remarked that the forms were mostly of very pale gray or brownish tints, banded with dark grey and purple, and showed a strong tendency towards the form of the female. Out of nearly 100 that were bred, two-thirds followed the type. The pupæ had been exposed to the intense frost of the winter, and the moths emerged within a fortnight of the frost breaking up; and in his opinion the preponderance of the pale forms did not corroborate Mr. Merrifield's idea that cold darkened the colour; the black form of the species occurred at Lee. Mr. Tugwell, referring to Mr. Fenn's exhibit, expressed an opinion that the brood did not always follow the form of the parent moth, and instanced *Acidalia aversata*, of which he had bred forms entirely distinct from the female, but, in reply to Mr. South, said he did not see the male parent. Mr. South remarked that in breeding Lepidoptera he invariably found the brood followed either the male or female parent, or resembled both. Mr. Mansbridge showed a melanic specimen of *Phigalia pedaria*, Fb. Mr. South then referred to the supposed variety of *Pygæra curtula*, L., exhibited at a previous meeting, by Mr. A. Robinson, and remarked that a similar form had been recorded by Mr. Whittich, and an analogous variety of *P. pigra*, Hufn., figured by Stephens. An exhibition of microscopical objects was then given by members.

April 9th.—The President in the chair. Mr. A. Hamm, of Reading, was elected a member. Mr. H. Moore exhibited *Caligo nemnon*, from South America, and *Metapodius sericollis*, from Trinidad. Mr. South, three varieties of *Miana strigilis*, Clerck, which were extraordinary forms of the var. *latruncula*, and had been sent to him for inspection by Mr. Jefferys, of Clevedon. Mr. R. Adkin, *Pædisca sordidana*, from Forres, and stated that these were very unlike the specimens from N. Devon. Mr. Cockerell read a note on variation; some discussion followed. Mr. S. Edwards contributed a paper on the Papilionidæ.—H. W. BARKER, *Hon. Sec.*

[Want of space compels us to omit the official report of this Society's Annual Exhibition. It will appear in the June number.—ED.]

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY. — *April 13th*, 1891. The President, S. J. Capper, F.L.S., F.E.S., in the chair. Messrs. J. Collins, of Warrington, and W. R. Scowcroft, of Prestwich, were elected members. Mr. J. E. Robson, F.E.S., of Hartlepool, read a paper entitled, "Are *Abraxas pantaria* and *A. ulmata* one species or two?" After remarking on the difficulty of obtaining exotic specimens of the genus, the author said that *A. pantaria* had been admitted into the British list on the authority of one specimen taken at Okehampton Park, Somerset. He referred to their geographical distribution, stating that *A. pantaria* only occurred in places where *A. ulmata* was absent; he then minutely described the two forms, comparing the markings of each, and pointed out the difference in the genital armature, which he considered was due to local and climatic causes altering the form of the genitalia. The paper, which was fully illustrated by many cases containing examples of the genus, led to considerable discussion as to what actually constituted a species. Mr. Tutt sent for exhibition the series of *Miana*, from Armagh, that recently caused so much controversy among London entomologists; but so palpably distinct were the specimens of *fasciuncula* and *strigilis*, and so obvious the ease with which the examples could be separated, that no discussion arose. Mr. Robson exhibited some fine varieties of butterflies, and Mr. Collins a wonderful variety of *Leucania lithargyria*, which had the hind wings deeply fimbriated with dark scales, the central portion of the wing being light. — F. N. PIERCE, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*March 16th*, 1891. — Mr. W. G. Blatch, President, in the chair. Messrs. P. J. and H. Pope were elected members. Mr. Blatch said he had noticed a large number of spring Lepidoptera at Hopwas Wood a few days previously, and had noticed that among the *Hybernia leucophearia*, light specimens seemed to prefer birch trees and dark specimens oaks and other trees with darker barks, their colours thus being assimilated to their surroundings. Mr. Thornewill said that round Burton he noticed what appeared to be two forms of *Phigalia pedaria*: one large and light, found early in open spaces; and one small and dark, and found later in the woods. Mr. Thornewill exhibited a number of *Xanthiæ* and read notes on them, making several suggestions which provoked considerable discussion.—C. J. WAINWRIGHT, *Hon. Sec.*

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STRUCTURE OF THE TERMINAL ABDOMINAL SEGMENTS IN THE MALES OF THE GENUS *EUPITHECIA*.

By F. Buchanan White, M.D., F.L.S., F.E.S.

(Plates I. & II.)

If the hairs which cover the terminal segments of the abdomen of the males of the genus *Eupithecia* are carefully removed, both the dorsal and ventral aspects of these segments will be found to show certain features which seem to afford specific distinctions. The features in question are due to certain well-defined thickenings of the chitinous material of the segments, and appear as plates which differ in colour and texture from the rest of the segment. I have been able to examine thirty-four species, and in no two species is the structure exactly the same.

Ultimate Segment: Dorsal aspect.—There is a considerable difference in the size of the plate in different species. In some (e.g., *E. pulchellata*, *E. castigata*, and *E. pumilata*) it neither reaches the apex nor the sides of the segment; in others (e.g., *E. venosata*, *E. satyrata*, and *E. sobrinata*) it attains the apex, but not the sides; whilst in a few species (e.g., *E. absinthiata*, *E. pusillata*, and *E. exiguata*) it occupies the whole, or nearly the whole, of the segment, as seen from above. The end of the plate is usually more or less rounded, although it is sometimes slightly pointed, as in *E. pulchellata*, or truncate, as in *E. nanata* and *E. trisignaria*. In a few species the apex is more or less distinctly emarginate or notched. The emargination is very distinct in *E. tenuiata* and *E. abbreviata*, but almost rudimentary in *E. dodoneata* and *E. helveticaria*.

Penultimate Segment: Dorsal aspect.—The whole, or nearly the whole, of the dorsal part of the segment is occupied by a plate, whose shape is very similar in all the species.

ULTIMATE SEGMENT: VENTRAL ASPECT.—There is great diversity in the form of the plate. In its simplest form it is triangular (e. g., *E. helveticaria* and *E. assimilata*), or somewhat triangular (e. g., *E. nanata*, *E. fraxinata*, and *E. minutata*). In some other species (e. g., *E. subnotata*, *E. scabiosata*, and *E. subfulvata*) the plate is more oblong in shape than triangular. In a few species the apex of the plate is quite entire (e. g., *E. vulgata*); in others it is minutely (e. g., *E. absinthiata*) or very distinctly (e. g., *E. pimpinellata*, *E. pusillata*, *E. albipunctata*) bifid, till finally the plate becomes divided into two processes united only at the base (e. g., *E. plumbeolata*, *E. castigata*), or apparently entirely distinct (e. g., *E. venosata*, *E. isogrammaria*). (I say apparently distinct, since they may be united under the over-lapping penultimate segment.)

PENULTIMATE SEGMENT: VENTRAL ASPECT.—A narrow plate, whose form varies according to the species, occupies the middle of the segment. In some species (e. g., *E. subnotata* and *E. tenuiata*) it does not reach the hind margin; in others (e. g., *E. minutata* and *E. indigata*) it just touches it. In the majority of cases, however, the hind margin is reached. In *E. venosata* the apex of this plate is emarginate.

THE VARIATION OF THE MARKINGS OF *PAPILIO MACHAON*.

By E. AUGUSTUS BOWLES, M.A.

MR. JENNER WEIR's fascinating theory concerning the probable possession of a costal ocellus by the common ancestor of the House of *Papilio* (Entom. 105) immediately set me to work to examine my series of *Papilio machaon*, and perhaps the following notes may possess some interest in connection with his able article:—

I think he rather underrates the extent of the red suffusion on the upper side of the lower wing of *P. machaon* when he says the second submarginal lunule of the lower wing is "occasionally found" to have a trace of the reddish colour. In eighteen specimens I examined, I find four males and one female with red in the first and second submarginal lunules of the lower wing; one female with red in the first, second, and third lunules; one female with red in the first, second, third, and fourth; and in one female in the first and sixth lunules, the sixth being the lunule immediately before the ocellus at the anal angle. Five males with red in the first lunule only; two males with the red entirely absent in all the lunules, and three with so small a number of red scales in the first lunule that they are scarcely noticeable without a magnifying-glass. Thus it is possible to have the red suffusion in the first four and the sixth lunules.

I regret to say I have not Mr. Jenner Weir's vast acquaintance with foreign allied species, but having noticed what, I think, a marked connection with the above conclusion, in a species which I find unnoticed by him (unless I have it wrongly named), I add it as my one ewe lamb of further evidence in support of the theory of vanished ocelli. I possess a butterfly named as *Papilio phorcas*, and said to be African, which has an irregular ocellus on the costal angle of the lower wing, the iris of which is blue, much suffused with red; then follow three lunules of red corresponding in position with the second, third, and fourth submarginal lunules of *P. machaon*, and there is another red lunule next to the very distinct ocellus at the anal angle. Thus, in both species, red is found in all the lunules excepting the fifth. May it not be possible that their common ancestor possessed six perfect ocelli?

I believe it is a generally accepted theory with evolutionist botanists that yellow was evolved in flowers before red. Perhaps this rule might be applicable also to the animal kingdom, and then may not *P. machaon* be on the road to acquire the further adornment of five additional ocelli?

In the above mentioned five males, in which red is so scanty, there is an additional peculiarity of marking on the upper wings. The yellow markings of the upper wing of a typical *P. machaon* seem to be arranged in four groups:—1. An interrupted line on the hind margin. 2. Eight small spots following the direction of the hind margin. 3. A broad mass extending from the costa near the tip of the wing to the inner margin, and divided into nine spots by black scales surrounding certain of the rays, the two of these spots nearest the costa being again divided by a roundish black spot in each, and the portion of the upper one nearest the hind margin and the tip of the wing is much suffused with black scales. 4. Two spots between the costa and the median ray, one of which is divided into three. The peculiarity in these five males consists of an additional round black spot, which is in the third yellow spot from the costa of group 3. These extra spots are only found on specimens that have very little or no red in the lunules of the under wings.

Myddelton House, Waltham Cross, May 14th, 1891.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. Perry Coste, F.C.S., F.L.S.

(Continued from p. 119.)

V.—The Chemical Aspect (*continued*).

I.

Before saying anything as to the nature of blue in the various species examined, I will first subjoin, as in the case of green, a list of a few exotic Lepidoptera on which I have been able to experiment since my tables of results were published last August.

Name.	Acid effect.	Alkaline effect.
Morpho menelaus ……	Less brilliant ……….	Less brilliant or O
Trepsichrois linnæi ("iris" purple) ..	The velvet "glow" dulled	The glow dulled
Hypolimnas bolina ("iris" purple) ..	(O) ……………….	(O) or much dulled, &c.
H. salmacis (violet)….	Duller …………….	Duller or O
Papilio polyctor (crescent marks) …………	Sort of "yellow" ……	Same as acid
	(All, except the HCl and HNO_3, specimens recovered within five days.)	
P. polyctor …………	Leaf-brown…………	Leaf-brown
P. philenor …………	Bronze …………..	Bronze
	(Recovering, in a few days, either the original bright blue or a bright *green*.)	
P. nireus……………	Steel-blue or steel-violet	Same as acid
P. sarpedon ……….	Transparent* or O ….	Paler or transparent
P. phorbanta ……….	Steel-blue or violet ….	Same as acid
P. leonidas …………	Partly transparent ….	Partly transparent

We will next, following our usual plan, arrange these blue species into groups; but, as will appear from the sequel, it is questionable whether all, except perhaps the *Lycænæ*, might not be put into one single group.

1.	2.	3.	4.	5.
Apatura iris *Trepsichrois linnæi* *Hypolimnas bolina*	*Papilio philenor* *P. polyctor* *P. nireus* *P. phorbanta* *P. sarpedon* *P. leonidas*	*Papilio machaon* *Limenitis sibylla* *Smerinthus ocellatus* *Catocala fraxini*	*Vanessa urticæ* *V. atalanta* *V. io* *V. antiopa* *Papilio polyctor* (the crescent marks)	*Lycæna alexis* *L. corydon* *L. adonis* *L. semiargus* *Cupido bochus*
6.	(addendum)			
H. salmacis	*Morpho menelaus*			

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* Nitric acid had the extraordinary effect of changing this into a pink.

Now, the first remark that I have to make about blue is that this is a thoroughly disappointing and unsatisfactory colour. There is almost as little satisfaction (in the way of discovering any pigment) to be got out of blue as out of black and white; whilst, in addition, there is considerable worry and perplexity attending the study of these blue wings. I may say at once that in this, alone of all the five colours, I have no clear evidence as yet of there being any pigment present; nay, further, in all the groups, except the Lycænidæ,—concerning which I am still in doubt,—it seems fairly certain that the colour is simply "physical." It is, of course, well known how comparatively rare a colour among flowers is blue; it seems there to mark some special complexity and specially high differentiation in the parts so coloured. It is, therefore, possible that there is, chemically, some considerable difficulty in the evolution of a blue pigment; and, may be, such has not been evolved among the Insecta; but, be that as it may, we must certainly admit that the want of pigmental blue in the Lepidoptera has been far more than compensated by the unsurpassable brilliancy of the physical blues in which they rejoice. Unfortunately, these physical blues, though very beautiful from an æsthetic standpoint, possess only the minimum of interest from the chemical.

After what I have said in the preceding section on "physical" greens and bronzes, &c., my readers will be able to follow the present discussion without further explanation on these points.

First, of all, as to group 1. In all three of these species there is the same rich purple velvet glow, unmistakably characterising this as a physical colour. Wallace had remarked, some years ago, that the blue of *A. iris* was probably a physical colour, and my experiments fully confirm this. Directly that *A. iris* came into my hands in the course of this research, I felt convinced that there was no pigment colour here; and so it proved. In these three species, the various reagents either are without effect or produce temporary dulling, or permanently injure the surface structure, and consequently the colour.

No. 2 group is still more unsatisfactory. The colours of the species noted here are clearly closely related to those greens which become bronzed or browned; it will be noticed that some of these become of a dull "leaf-brown," which seems to point to some temporary injury or alteration of a fine surface structure; others become of a steel-blue, which is strikingly "physical" in appearance. Concerning this group, also, there can be no doubt as to the physical nature of the colours throughout. I have included in this group, also, *M. menelaus*, the brilliant blue of which, as I only too truly anticipated, is simply physical. Indeed, it may well be doubted (is there even room for doubt?) whether any pigment could possibly yield the extraordinary *sheen* that characterises this and some other blues.*

Group 3 is even less satisfactory and less interesting than the last. I have already referred to the blue of *P. machaon*. Anyone who wishes to observe a good example of the behaviour of a physical colour should try the experiment of thoroughly wetting this blue spot on *machaon*, and watching the blue reappearing as the wing dries. The blue of *S. ocellatus* is most unsatisfactory, and, I believe, of the same nature as that of *machaon*. As to *C. fraxini*, I have, in a former place, expressed my intense disappointment at being able to find no kind of clue or connection between this blue and the scarlet of *nupta*, and so many other *Catocalæ*.† It is however, I think, hardly possible to doubt that in *Catocala fraxini* we have simply a physical blue in evidence, and that by no means a brilliant one either.

Before proceeding to group 4, I must make a passing reference to *Hypolimnas salmacis*. My only reason for placing this in a group by itself was not any peculiarity in its behaviour, but simply the fact that its natural colour was a violet, something different, therefore, from any of the other species included in my lists. It is, of course, merely another physical colour.

Now for group 4—the Vanessidæ. Sadly, indeed, was I disappointed in these species. In the early days of my experiments I expected great things from experimenting on these beautiful blues. Knowing that in flowers blue usually appeared on highly differentiated parts, it appeared to me of special interest that in the *Vanessæ* the blue should, in most cases, appear as a row of spots *near the edge of the wing;* and, also, on *V. io* in the conspicuous and clearly highly developed ocellus. To the examination of the *Vanessa* blues, therefore, I devoted myself with special interest and attention in the early stages of my work, and made very numerous, repeated, and careful experiments on them. I had not then learned how heavy were the probabilities against any blue being a pigment colour; and it seemed scarcely credible to me that so highly differentiated a pigment, as I assumed the blue to be, should offer any resistance to strong reagents. However, after long and careful experimenting,—in the course of which, as will be noted, I examined four species of *Vanessa*, and in two species separately examined the blue on different parts of the wing,—the hard logic of facts drove me to conclude that in *Vanessa* the blue is pretty certainly *physical*. The phenomena throughout are in accord with this, especially so the frequently observed fact that the blue might vanish during treatment, but reappear on drying the wing. It will be noted that in

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* There is another brilliant blue species, whose name I do not know, often to be seen in dealers' cases. In one light this is a brilliant blue, like *menelaus;* in another, a dull colourless brownish. Of course it is positively certain that such a colour must be physical.

† *Ante*, p. 15.

antiopa the blue was least resistent to the reagents; there is of course, as already explained, nothing contradictory in a physical colour thus disappearing. I have included in this group the crescent-shaped blue marks on *P. polyctor*, since the behaviour of these strongly recalled that of the Vanessidæ, especially *V. io*. It is especially to be noted that this blue also returned in a few days.*

And now, in conclusion, we come to the group of *Lycænæ*. I do not know what to say about these species. They are the only blues I know of which are not certainly physical. At one time I thought it highly probable that these were, anyhow, pigment colours; but further reflection and experience have considerably modified my views. On the one hand, there were obtained in each species colour changes, chiefly to a slate colour or grey, that I at one time thought pretty good evidence for a pigment; but, in the light of later work, this conclusion seems to me much shaken. Here, again, we are arguing so much in the dark, being left without any clear answer, such as would be given by either a "solution" or a "reversible" effect. As against the supposition that there is any pigment here, we must set the facts that in *corydon*, at any rate, the blue is suspiciously metallic in appearance; while the same remark applies to many specimens of the *female* of *alexis*—such species, I mean, as are in the intermediate stage of colouring, between the brown of the normal female and the full blue of the male. In addition, I would draw attention to the facts that, as recorded in my original tables,† the blue in several instances acquired a *greenish* tint. This appears to me, now, very suspicious, and somewhat indicative of a physical blue; but since no undoubted pigment blue has yet been found, it is, of course, impossible to assert that such would not become green under the influence of reagents. On the whole, then, pending the appearance of fresh evidence, it seems to me that all we are justified in asserting of *Lycæna*-blue is that it is, anyhow, somewhat different in character from any of the other blues. This much seems clearly shown by its reactions; but whether it be a physical or chemical colour we cannot at present decide.

J.

Having thus examined in turn the evidence yielded by the reactions of each of the various colours, it only remains briefly to sum up the results, before passing on to the few remarks that have to be made on the biological aspect of these experiments. At the same time I may also take the opportunity to make one or two corrections and additions to previous statements.

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* It was very difficult to know how to describe the reaction of this species. I have entered the change as that to a "sort of yellow," on account of the appearance of the traces whence the blue had temporarily disappeared. But it must not for a moment be supposed that there was here any question of an actual chemical change to yellow.

† Entom. xxiii. 252.

The most important of these concerns the remarkable behaviour of certain yellow species when submitted to the action of wet potassium cyanide. An account of experiments on this subject—originally written in November, for a footnote to subsection F, but subsequently held back from considerations of space—will be found as an appendix to this section. Again, on looking back, I find that I had adduced* the reactions of *T. rubi* and of the blue Lycænidæ in support of my contention that all the changes effected by my reagents were retrogressive. After the conclusions set forth in the preceding subsections (H and I), however, it is clear that neither of these reactions can properly be quoted as evidence for retrogressive change in pigment colours. For the defence of the position taken up on this subject of retrogressive changes, I can very safely rely on the argument from red species, as stated in subsection E.

Furthermore, I see that in a footnote† to subsection F, as well as in the text, I had referred to the behaviour of *pink* species, and adverted to the possibility that these were changed not to yellow but to white. This remark now seems to me very ill advised and misleading, especially in view of the explanation that I have been at some trouble to set forth in (F) previous pages concerning the relations of red and yellow. In subsequent examination of other pink species, I have found the yellow so pale and feeble (most unlike the bold orange-yellow of, e. g., *Zygæna* and *Arctia*) that it might be easily overlooked, and carelessly mistaken for white. It seems, too, only reasonable that a pale delicate pink should yield a far paler yellow than does a prominent crimson or scarlet.‡ Since, moreover, these pinks agree entirely with the other reds in showing the "reversible" effect, it is certain that their constitution is the same. My hypothetical supposition of a subclass for pinks is, therefore,—as I now think on mature consideration,—entirely erroneous. Indeed, I feel such thorough confidence in the argument from the behaviour of red in general, that if I found a pink species which to a positive certainty changed to white, but showed also the "reversible" effect, I should feel bound to hold that there was yet a yellow pigment there, though so slight and pale as to be imperceptible.§ And, furthermore, if in any case an indubitable white were produced, and no reversible effect were obtainable, we should then have simply an exactly analogous case to that of *Delias*, in which the red first changes to yellow, and then this is dissolved, leaving a white wing. I have, perhaps, spoken at undue length on this point, but it seemed to me necessary to clear up any misunderstanding that may have arisen from what I now see to have been a very misleading statement.

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* Entom. xxiii. p. 371. † *Ante*, p. 15.

‡ The amount of pigment present in some of these pink species seems to me to be exceedingly small, as might be anticipated from the pale and delicate colour. There is also special difficulty in observing the exact tint produced, since in many cases the background (*e.g.*, in Sphinges) is very troublesome.

§ It must be remembered that "yellow" is used in a broad sense. The essential difference is between the pigment yellow (*however pale*) and the non-pigment white.

As to the yellow colour of *G. cleopatra*, concerning which I had originally surmised that it would prove very immovable,[*] I believe that I have already corrected this error by stating that on experimenting with this species I found the yellow to dissolve out, leaving a white wing.

As additional points of interest that have recently turned up, I may note that among some American Bombyces, sent me by Mr. F. M. Jones, were several species of a kind of chestnut colour, which were changed to yellow by acids; thus, again, exemplifying the close relationship of chestnut and yellow. With these should be compared the reaction of *Melitæa athalia*.[†] Moreover, in two species, *Samia cecropia* (chestnut) and *Callosomia promethea* (a sort of red-brown), after this transformation to yellow, a *slight reversion effect to the original colours* could be obtained, just as in the reds. This appears to me specially interesting, and to point to the fact that these species are—in a coloric sense—connecting links. Furthermore, one of these same American Bombyces, viz., *C. promethea*, was marked with such an unusual looking black that I was induced to experiment upon it. My suspicions were partially justified, for *one* reagent—nitric acid—converted this black into a definite brown. This is certainly a notable exception to the usual behaviour of black; but whether in this species there be really any pigment present, or whether—as I strongly incline to hold—the reaction here was simply that of a *physical* colour, it is as yet impossible to say. Anyhow, the fact is worth recording. In this connection, too, I may add that various black-marked species, such as *Arge galatea*, *A. paphia*, &c., have recently been soaked in 30 per cent. hydrochloric acid *for many days* without the black being affected.[‡]

Before proceeding to the genealogy of the colours it seems to me only right to point out one or two real or apparent difficulties connected with my rigid separation of physical from pigmental colours. These difficulties arise from the several instances in which the red (pigmental) of one species is replaced by blue (physical) in a closely-allied species.

First of all there is the case of *Catocala fraxini* (the "Clifton nonpareil" or "blue underwing"). In the larger genus of *Catocala* there are a great number of species with red or crimson bands on the under wing; these reds are of course pigmental. There are also species with orange or yellow bands; and these, too, are clearly pigmental. But in the case of *C. fraxini* we have neither red nor yellow, but blue — a physical colour. This appears, at first sight, a rather grave difficulty, but it is lessened considerably by the fact that the one blue band of *fraxini* is *not* in the same position as the bands of, e. g., *C. nupta*, but is in a position intermediate between these. More difficult to understand, however, is the case of a species of *Vanessa*,* which I recently saw in Mr. Leech's collection. In this species the (pigmental) red of *V. atalanta* was represented by a blue, that, judging from its appearance, I should say was certainly physical. Finally, it has lately been stated, by Dr. Seitz,† that in a restricted woodland area in S. Brazil the great majority of the insects (*not Lepidoptera only*) were blue; whilst, only a few miles off, red was dominant. This appears to me—taking the statement to be correct—strongly indicative of a blue pigment, produced by some chemical difference in the district. If this be so, it is certainly strange that among so many different families examined I should have found no blue pigment; and I can only say that I should greatly like to experiment on some of those species referred to by Dr. Seitz.

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[*] *Ante*, p. 38. [†] Entom. xxiii. p. 250.

[‡] I have recently found certain evidence of the presence of pigment in several dull-coloured species, such as *H. semele*, *E. hyperanthes* or *S. egerides* (or both), where, from the superficial appearance, one might have supposed there was nothing but a physical blackish.

Now for the relations of the colours. Black and white of course are out of court altogether; so is blue, since even if the Lycænidæ should turn out to be pigmental, it is impossible, in the present state of our knowledge, to bring this blue, reverting to slate colour or grey, into any genetic relation with the other colours. There remain, then, red (including pink); yellow, in all its modifications; chestnut, also in various modifications; and the (pigmental) greens. Now the facts known to us are these:—Orange and red and pink are developed from yellow; a few reds are developed from chestnut; chestnut and yellow are very closely allied indeed in constitution, indeed it is difficult to draw any definite line of demarcation between some chestnuts and some yellows; green is, not improbably, also developed from yellow, although of this it is not possible to speak certainly at present. Finally, we may have such a thing as a *latent* yellow pigment, as demonstrated by the phenomenon of *A. galatea.* These facts I have sought to bring together, in an easily grasped graphic form, by means of the accompanying genealogical tree. It does not appear to me to involve much unproven theory, except as regards the assumption that the different stems start from one *original* pigment molecule, which, for the sake of a concrete illustration, I have called "*galatea*" stage. This illustration, it will be understood, is adopted only for the sake of plainly grouping all the facts together. It involves, however, very little trespass beyond our known facts. In partial defence of it, I might perhaps point out that *galatea*, which we know *does possess* a "pigment mother substance" convertible to yellow, is very closely allied, entomologically, to the various genera of Satyridæ, most of which are coloured by a chestnut pigment. I do not wish to insist on this fact, but still it is significant in relation to the present argument. There will also be found in the following and concluding section (on the biological aspect) a discussion of certain reported facts in variation which *may* throw very considerable light on, and, indeed, if correct, must be considered a remarkable confirmation of, these arguments.

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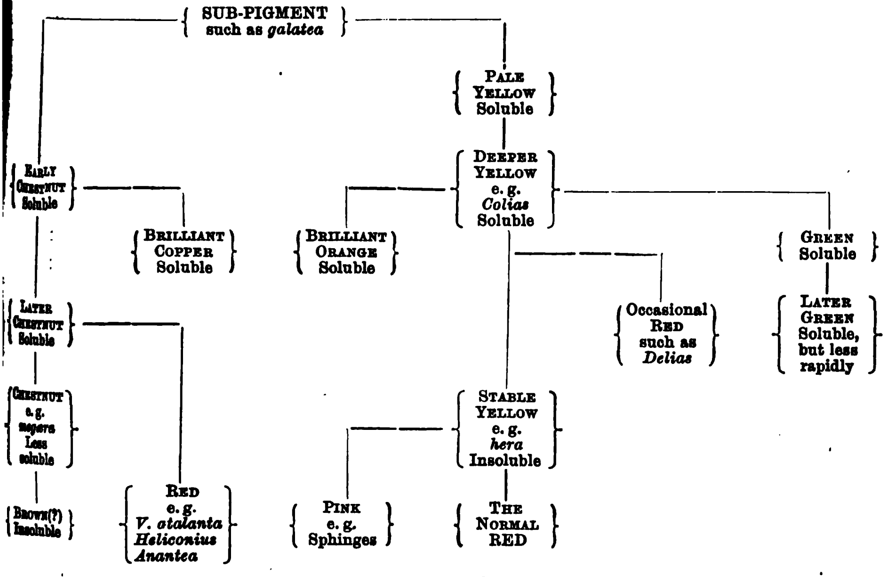
* *Vanessa charonia*, Dru. (Ed.)

† 'Zoolog. Jahrb.,' v. (1890); quoted in 'Microscopic Soc. Jl.,' 1890, p. 712.

GENEALOGY OF PIGMENT COLOURS.


SUB-PIGMENT such as *galatea*
PALE YELLOW Soluble
DEEPER YELLOW e. g. *Colias* Soluble
EARLY CHESTNUT Soluble
BRILLIANT COPPER Soluble
BRILLIANT ORANGE Soluble
GREEN Soluble
LATER CHESTNUT Soluble
Occasional RED such as *Delias*
LATER GREEN Soluble, but less rapidly
CHESTNUT e. g. *megera* Less soluble
STABLE YELLOW e. g. *hera* Insoluble
BROWN(?) Insoluble
RED e. g. *V. atalanta* *Heliconius* *Anantea*
PINK e. g. Sphinges
THE NORMAL RED

(To be continued).

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

Compiled by T. D. A. Cockerell.

(Continued from p. 121.)

Subf. *Apameinæ.*

Gortyna ochracea, Hb., West Hampstead; Kilburn; Willesden; Hammersmith; on the site of present Earl's Court Station; on the site of Shirland Road; back of Warrington Crescent, Maida Vale (*Godwin*); Mill Hill, bred from pupæ found in burdock-stem (*South*); Bedford Park, 1886 (*Ckll.*).

Hydrœcia nictitans, Bork., Bishop's Wood, Hampstead; Hammersmith (*Godwin*); Mill Hill, at sugar (*South*); Hampstead

Heath (*Watts*); Chiswick (*Sich*); Harefield (*Wall*). *H. micacea*, Esp., Hampstead; Clutterhouse Lane; Neasdon (*Godwin*); Mill Hill (*South*); Bedford Park (*L. M. Cockerell*); Finchley (*Shepherd*); Hammersmith (*Mera*); Hampstead Heath, common (*Watts*); Chiswick, once at marjoram bloom (*Sich*).

Axylia putris, L., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Chiswick (*Sich*).

Xylophasia rurea, Fb., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill (*South*); Bishop's Wood (*Shepherd*); Harefield, common (*Wall*). *X. lithoxylea*, Fb., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill, at sugar (*South*); Bishop's Wood (*Shepherd*); South Hampstead, common (*Watts*); Harefield (*Wall*); Hammersmith (*Tarbat*); Clapton (*Bacot*). *X. sublustris*, Esp., Harefield, common in 1888 (*Wall*). *X. monoglypha*, Hufn., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bedford Park (*Ckll.*); Bishop's Wood (*Shepherd*); Hammersmith (*Mera*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*). *X. hepatica*, L., Hampstead; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill (*South*); Chiswick, once (*Sich*). *X. scolopacina*, Esp., Bishop's Wood, Hampstead, especially larvæ, common, 1873 (*Godwin*); Highgate (*Mera*).

Dipterygia scabriuscula, L., Bishop's Wood; Clutterhouse Lane; Kingsbury (*Godwin*); Mill Hill, at sugar (*South*); Highgate (*Mera*); Regent's Park, 1882 (*Watts*); Chiswick (*Sich*); Harefield, 1887 (*Wall*); Hammersmith (*Tarbat*).

Neuronia popularis, Fb., Hampstead Heath; banks of Thames between Putney and Hammersmith (*Godwin*); Mill Hill, at light, comes about 9.30 p.m. (*South*); Harefield (*Wall*).

Charæas graminis, L., Hampstead Heath; one specimen on Old Oak Common (*Godwin*).

Cerigo matura, Hufn., Bishop's Wood, not common (*Godwin*);* Mill Hill (*South*); Harefield (*Wall*).

Luperina testacea, Hb., Hampstead Heath (*Godwin*); Mill Hill, at sugar, and at light (*South*); Bedford Park (*Ckll.*); Highgate (*Shepherd*). *L. cespitis*, Fb., Hampstead Heath, rare (*Godwin*); Mill Hill, at station lamp, 1875 (*South*).

Mamestra sordida, Bork., Mill Hill (*South*); South Hampstead (*Watts*). *M. brassicæ*, L.,† generally distributed (*Godwin*); Mill Hill, at sugar (*South*); Isleworth (*Fenn*); Bedford Park (*Miss E. Sharpe*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*);

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* Cited in the MS. list as *texta*.

† On account of its armed tibia, hairy eyes, and the peculiar male genitalia, this species has been placed by Smith and Grote in a distinct genus, *Barathra*, Hb. (= *Copimamestra* Grote).

Dalston (*Prout*). *M. persicariæ*, L., Mill Hill, at sugar (*South*); Bedford Park (*Miss E. Sharpe*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); larvæ very abundant in garden, South Hampstead (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Bloomsbury (*Brit. Mus.*). *M. abjecta*, Hb.,* Willesden (*S. T. Klein*, J. of Micr. and Nat. Sci., 1887).

Apamea basilinea, Fb., Hampstead (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bedford Park (*Ckll.*); Bishop's Wood (*Shepherd*); Hammersmith (*Mera*); Tottenham (*Prout*). *A. unanimis*, Tr., Mill Hill, at sugar, and also larvæ (*South*); Tufnell Park (*Shepherd*). *A. ophiogramma*, Esp., Hammersmith (*Mera*); common at South Hampstead (*Watts*); Chiswick, once (*Sich*). *A. didyma*, Esp., Hampstead; Old Oak Common; Hendon; Clutterhouse Lane (*Godwin*); Mill Hill (*South*); Bedford Park (*Miss E. Sharpe*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); Chiswick, extremely abundant (*Sich*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*). *A. leucostigma*, Hb., near Uxbridge† (*Benbow*, Entom., 1878, p. 21).

Miana strigilis, Clerck, common (*Godwin*); Mill Hill (*South*); Finchley (*Shepherd*); Hammersmith (*Mera*); Hampstead (*Watts*); Chiswick (*Sich*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*). *M. strigilis* var. *æthiops*, Haw., Highgate (*Shepherd*); very abundant in garden, South Hampstead (*Watts*); see also Entom., 1888, pp. 60, 93, 111, 112. 247, 249. *M. fasciuncula*, Haw.,‡ Kensal Green (*Godwin*); Mill Hill (*South*); Finchley (*Shepherd*); Hammersmith (*Mera*); Hendon, abundant, 1881 (*Watts*); Chiswick, one (*Sich*); Harefield (*Wall*). *M. bicoloria*, Vill., Clutterhouse Lane (*Godwin*); Mill Hill (*South*); Finchley (*Shepherd*); Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*); Chiswick (*Sich*). *M. arcuosa*, Haw., Hampstead Heath; West Hampstead; Old Oak Common, in abundance (*Godwin*); Mill Hill, flying at dusk over grass in damp fields (*South*); Finchley (*Shepherd*); Pinner (*Watts*); Harefield (*Wall*).

Subf. *Hadeninæ*.§

Dianthœcia capsincola, Hb., Old Oak Common, larvæ, common (*Godwin*); Mill Hill, at sugar (*South*); Bedford Park, larvæ on *Lychnis vespertina*, 1886 (*Ckll.*); South Hampstead (*Watts*); Harefield (*Wall*). *D. cucubali*, Fues., Clutterhouse Lane, larvæ, common (*Godwin*); Mill Hill (*South*). *D. carpophaga*, Bork., Mill Hill, at sugar, and also bred (*South*); Harefield, two taken (*Wall*).

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* *M. abjecta* is placed by Mr. Tutt in *Hadena*.

† As *fibrosa*. This species is placed by some in a separate genus, *Helotropha*, Ld.

‡ This has been considered a variety of *strigilis* by Mr. Tutt; but Mr. Pearce (Brit. Nat., April) seems to have proved the distinctness of the two species beyond doubt.

§ This subfamily seems to come more naturally here than where it occurs in our lists. *Hadena*, Guen., is considered by Mr. Butler a group of *Mamestra*.

Hecatera serena, Fb., Old Oak Common (*Godwin*); Mill Hill (*South*); Bishop's Wood (*Shepherd*); near Acton (*Mera*); Hampstead (*Watts*); Chiswick, common (*Sich*).

Polia flavicincta, Fb., Mill Hill, at sugar (*South*); Harefield, occasional (*Wall*); Bedford Park, one specimen, 1890 (*Ckll.*). Newman says of this species, "common near London"; but in Middlesex it appears to be rather rare.

Epunda nigra, Haw., Willesden (*Klein*).

Cleoceris viminalis, Fb., Harefield, two taken (*Wall*).

Miselia oxyacanthæ, L., generally distributed (*Godwin*); Mill Hill (*South*); Bishop's Wood (*Shepherd*); Harefield (*Wall*). *M. oxyacanthæ*, form *capucina*, Mill., Harefield, occasional (*Wall*); Mill Hill, not uncommon (*South*).

Agriopis aprilina, L., Bishop's Wood, rare (*Godwin*); Mill Hill, at sugar, also bred (*South*); Pinner and Stanmore, pupæ (*Watts*); Harefield (*Wall*).

Euplexia lucipara, L., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Tufnell Park (*Shepherd*); larvæ very abundant in garden (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Chiswick, larvæ on mullein and *Lastræa* (*Sich*).

Phlogophora meticulosa, L., generally distributed (*Godwin*); Mill Hill (*South*); Bedford Park (*Miss E. Sharpe*); Tufnell Park (*Shepherd*); Chiswick (*Mera*); Hampstead (*Watts*); Harefield (*Wall*); Isleworth, larva on lemon-geranium (*Ckll.*); Bedford Park, 1890, larva on *Polygonum cuspidatum* (*Ckll.*); Clapton (*Bacot*); Dalston (*Prout*).

Aplecta nebulosa, Hufn., Bishop's Wood (*Godwin*); Hampstead, 1880, &c. (*Watts*); a dark var. in Highgate Woods (*Hodges*, fide *Buckell*, Ent. Rec., 1890, p. 160).

Hadena protea, Bork., Bishop's Wood; Kingsbury; Old Oak Common (*Godwin*); Mill Hill (*South*); Harrow (*Watts*); Harefield (*Wall*). *H. dentina*, Esp., Kingsbury (*Godwin*); Mill Hill (*South*); near Ealing (*Mera*); South Hampstead (*Watts*). *H. trifolii*, Rott., common generally (*Godwin*); Mill Hill (*South*); Bedford Park (*L. M. Cockerell*); Bishop's Wood (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Chiswick, larva on cultivated asparagus (*Sich*). *H. atriplicis*, L., Hampstead (*Newman*). *H. oleracea*, L., generally common (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bedford Park (*C. Rowland*); Finchley (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*); Chiswick, larva on *Convolvulus major*, &c. (*Sich*). *H. pisi*, L., Bishop's Wood, common; Hampstead Heath (*Godwin*); Mill Hill (*South*); Hammersmith (*Mera*). *H. thalassina*, Rott., Hampstead Heath, on fences (*Godwin*); Mill Hill (*South*). *H. genistæ*, Bork., Old Oak Common; Hampstead Heath, rare on fences (*Godwin*); Mill Hill (*South*); Harefield, one bred from pupa (*Wall*).

Subf. *Caradrininæ.*

Grammesia trigrammica, Hufn., Hampstead; Clutterhouse Lane; Kingsbury; Old Oak Common (*Godwin*); Mill Hill, at sugar, very abundant (*South*); Finchley (*Shepherd*); Harefield (*Wall*).

Caradrina morpheus, Hufn., Clutterhouse Lane (*Godwin*); Mill Hill, at privet blossom, sugar, and honey-dew (*South*); Tufnell Park (*Shepherd*); South Hampstead (*Watts*); Clapton (*Bacot*); Dalston (*Prout*); Chiswick (*Sich*). *C. alsines*, Brahm., Mill Hill, at privet blossom, sugar, and honey-dew (*South*); Tufnell Park (*Shepherd*); Harefield (*Wall*); Chiswick, once (*Sich*). *C. taraxaci*, Hb., Elgin Road (*Godwin*); Mill Hill, at privet blossom, sugar, and honey-dew (*South*); Kentish Town (*Shepherd*); Harefield (*Wall*). *C. quadripunctata*, Fb., Elgin Road (*Godwin*); Mill Hill, at privet blossom, sugar, and honey-dew (*South*); Tufnell Park (*Shepherd*); South Hampstead (*Watts*); Harefield (*Wall*); South Kensington (*Chitty*); Dalston (*Prout*); Chiswick (*Sich*).

Rusina tenebrosa, Hb., Kingsbury; Bishop's Wood, Hampstead (*Godwin*); Highgate (*Mera*).

(To be continued.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

Notes on Spring Lepidoptera in the Chester District.—The evening of February 27th was fine, warm, starry, and accompanied by slight fog. From the gas-lamps I took *Hybernia rupicapraria*, *H. marginaria* (*progemmaria*), and *H. defoliaria* — the latter being common, and, like my other February specimens, apparently fresh from the chrysalis. March 17th. — In the evening I searched an early flowering sallow for moths; result, not a moth to be seen. March 21st.—I went to Delamere Forest in quest of a female *Nyssia hispidaria* for a friend; I only took a couple of males. Saw three male and one female *H. marginaria* (very light-coloured, as all the Delamere specimens are that I have come across), one *Anisopteryx æscularia*. Took half-a-dozen male *H. leucophearia*, which included the light and dark forms figured by Newman, as well as intermediates. March 24th.—A specimen of *A. flavicornis*—the larva I came across in the forest last summer—emerged at 12.30 a.m. April 4th.—I paid another visit to Delamere; went through the usual 5½ hours' solitary search: one male *N. hispidaria*, just out of the chrysalis (they emerge from mid-day up to about 3 p.m.). Left it on a tree to expand its wings in natural conditions: the interrupted process (say, in a pocket box) is almost certain—I might say certain—to end in what is known as "saccular distension." Marked the tree, of course, for my return, when I found the moth to be a finely-developed insect. My total captures numbered three: the *Nyssia*, a male *H. leucophearia*, and a male *A. æscularia* drying its wings on an oak. I find my luck with *N. hispidaria* to be on a par with that of other entomologists who have worked the forest for it this season. I have only heard of the capture of a solitary female. The fact, probably, is that the insect, like a few more "good things," is difficult to *time*—an important factor in studying the preservation of species! April 5th.—Warm, spring-like. The *Tæniocampa* larva taken from a garden rocket last June, in the Vale of Llangollen, and referred to in my notes (Entom. 16), emerged a fine *T. stabilis*, with all due honours, including the "black dot at the base of the wing" (Newman, p. 361). My notes describe this larva as follows:—"Apple-green, delicately suffused or mottled with white along the back; head apple-green, and smaller than the second segment; each segment is well divided by a yellowish division, as in *Pachnobia leucographa*. When disturbed it curls up first half of body like *P. leucographa*. Thin white dorsal line, not very distinct, down middle of back; a broad clearly-defined white stripe along each side; between this stripe, on each side, and the dorsal white line is another thin white stripe; under surface and sides apple-green; body has a few, but very few, short black hairs; the body tapers towards each extremity, especially towards the head. I fed it on sallow." April 6th.—Breeze N.E. again. Bitterly cold. In the Chester cemetery, after dark, I searched the sallows with the aid of my pocket-lamp. On one bush only I found moths—a couple of *T. gothica*. The sallow bloom, with the exception of a few dwarf bushes, was over, in the Chester district, by the 8th of May. The earliest flowers I came across were upon a solitary tree, March 17th. *Tæniocampa stabilis* and *T. gothica* have scarcely been as plentiful as they might have been. The first-named varies with us, in shade, from grey to russet-colour. I have had moths of both species confined in glass jars, with a gauze covering, elastic band, and square of glass on the top,—feeding them daily with fresh catkins in blossom,—in order to obtain eggs, and test the variation in colour and markings of the caterpillars, which, I have reason to think, in the case of *T. stabilis*, is considerable. I have succeeded in each case; the eggs of the last-mentioned have just hatched, and the larvæ are little black-headed fellows, at present with almost colourless bodies. *T. cruda* I found so uncommon that I only came across four specimens. *T. gracilis*—never a common moth with us—was such a rarity this season that I only secured a solitary male. It is a remarkable fact that I never once saw *T. incerta* (*instabilis*), and, up to date, I have not even heard of *T. opima* being seen. The Geometers observed about the sallows—such as *Selenia bilunaria* (*illunaria*), *Anticlea badiata*, *Hybernia marginaria* (*progemmaria*)—have been as plentiful as ever; fine specimens of *A. badiata* are still nightly on the wing. *Cidaria suffumata* I first noticed on the night of May 9th—commonly enough. *Nyssia zonaria* appeared April 26th, but females only! Of hybernating caterpillars I saw *Arctia caja* on April 25th. Larvæ of *Agrotis ashworthii* have been exceedingly scarce this season. It may interest young entomologists to know that sloe and sallow—especially dwarf bushes—should, up to the end of June, be searched for night-feeding larvæ, with, of course, the aid of a lantern. Dock leaves, not forgetting the under sides, chickweed, groundsel, violets, &c., should also be examined. After June, search the leaves of sallow, oak and birch well over in the daylight, and do not miss the under surfaces, for eggs and larvæ. You will often come across "good things," and, even amongst common ones, surprises and matters of interest—unheard of in books—will frequently occur. Speaking of violets—I mean the scented ones—we have the three varieties (all within four miles of Chester), the white, the pink, and the violet forms. Were they moths they would certainly be separated by distinctive names; but our botanists refuse to recognise any other synonym than the common, but amply descriptive, *Viola odorata*. My first butterfly, *Pieris rapæ*, appeared on May 2nd. All the fruit trees here, including the almond, which, by the way, not only blossoms at Chester but bears fruit, are now in full and magnificent bloom.—J. Arkle; Chester, May 11, 1891.

The Sallows in Yorkshire in 1891.—In this district sallows have been late, owing to the cold weather; however, on Tuesday evening, April 14th, 1891, I and Mr. S. Walker, of this city, visited Bishop's Wood, near Selby, and having selected several likely trees situate on the border of the wood and principal ride, as soon as darkness set in we commenced shaking into two large sheets which we had brought with us, and succeeded in taking a few *Tæniocampa populeti* (for which this wood is noted); they were mostly in fair condition, although a few showed signs of having been out some time. I was fortunate enough to take one specimen of *Pachnobia leucographa*, which was in fine condition, evidently having just emerged. This species is generally somewhat later in its appearance than the rest of the Tæniocampæ. *T. cruda* was fairly common, and from amongst those seen we managed to select a few slight varieties. *T. gothica* was not uncommon, and all the specimens seen were in good condition. *T. instabilis*, *T. stabilis*, and *P. munda* occurred sparingly, together with an odd specimen or two of *T. rubricosa*. *Cerastis vaccinii* was the only other species noted, and of this we saw few examples. *T. gracilis* was very conspicuous by its absence, as neither of us saw a single specimen. This species seems to emerge later than others of the genus. None of the species taken during the evening occurred in any numbers; and this was the more surprising seeing that the night was, or appeared to be, a very suitable one as it was dark, warm, and still, with the wind in the north-west. On the borders of the wood, after dark, we noticed *Anticlea badiata* flying commonly, as many as six and eight being seen at one time; it seemed to be most abundant about 10 p.m. The specimens taken were in good condition. We also noticed three or four *Hybernia marginaria* (*progemmaria*), which were of course worn, and a few *Diurnea fagella* at rest and on the wing. We returned to York by the 12.30 midnight train from Selby, after having spent a most enjoyable evening.—W. Hewett; 12, Howard Street, York.

An Entomological Myth.—Mr. Dale (Entom. 123) appears to have overlooked Mr. Buckler's description and differentiation of the larvæ of *Cucullia scrophulariæ* and *verbasci* in E. M. M. iv. 116. The larvæ of *scrophulariæ* there described were received from Mr. Doubleday on 8th July, 1867, and though it is not said they were British, I have always presumed they were, as nothing was said to the contrary; but with this exception I have never met with any trace of true *scrophulariæ* in Britain. In all the collections I have seen it is either unrepresented, or *verbasci* does duty for it. The perfect insect much more closely resembles *lychnitis* than *verbasci*, and might readily be passed over for it, the chief differences being in the costal streak in *lychnitis* being narrower than in *scrophulariæ*, as well as blacker in colour, and the pale area in the centre of the wing being consequently more extensive. Though I have had no personal experience with them, I think it probable that the larvæ of all the three will feed on any of the mulleins or figworts. If we could assume that the larvæ sent by Mr. Doubleday to Mr. Buckler in 1867 were not British, we might further assume that Haworth really had *lychnitis*, and called it *scrophulariæ* in error. This would clear up the mystery; and I certainly think, until some positive evidence can be produced of its occurrence in Britain, the very little purely negative evidence that exists is not enough to entitle it to be retained on our lists.—John E. Robson; Hartlepool.

Cucullia scrophulariæ in England.—With regard to Mr. Dale's enquiry (Entom. 123) as to whether this species had been taken in England, I believe there is no doubt but that it has; but it is extremely rare. The late Mr. Frederick Bond was quite certain it was a distinct species, not separable in the imago, but distinct in the larval state. During Mr. Bond's long experience, he was accustomed every year to see abundance of *verbasci*, both on mullein and figwort, and was consequently well acquainted with the larva, but he never found *scrophulariæ* excepting at *one* spot, a railway cutting at Whittlesford, where the larva formerly occurred abundantly. During the later years of Mr. Bond's life, he many times searched this place and the neighbourhood for larvæ of *scrophulariæ*, but never succeeded in again finding it. He told me there was not the possibility of mistaking the larva, if seen, as it was quite distinct in appearance from *verbasci*. Stainton indicates that *scrophulariæ* is the smaller insect of the two, and a continental type of *scrophulariæ*, which I have is much smaller than my *verbasci*; indeed, I have only one which at all approaches it in smallness, though there is this reservation to be borne in mind, that I have at times bred large numbers of *verbasci*, and would doubtless pick the largest for the cabinet. I have several plants of both *Verbascum nigrum* and also *thapsus*, in the garden, and there is generally a batch of larvæ on the former, and sometimes also on the latter, but *nigrum* is generally preferred. *Scrophularia aquatica* is common in ditches in the neighbourhood, and the larva is usually plentiful upon it.—Alfred Balding; Wisbech.

Cucullia scrophulariæ probably specifically identical with C. lychnitis.—In his note (Entom. 123) Mr. Dale repeats what I have long stated privately, and I believe also in notes to the 'Entomologist,' that *C. scrophulariæ* is probably not found in Great Britain at all; indeed I share the doubts hinted at by Guenée as to the validity of the species. I have specimens of the imago from Dr. Staudinger, taken in Saxony; from the excellent entomologist, lately a curator at the Hamburg Museum, taken in that district; and also specimens bred from larvæ sent to Mons. A. Wailly from Toulouse at my request. All these agree, and Guenée correctly describes the differences, which are indeed readily apparent. I have also specimens of the larvæ from all these places, and they too are palpably different from *C. verbasci*. The doubt comes in when *scrophulariæ* is compared with *lychnitis*. I have the imago of *lychnitis* from Bohemia, South of France, and different sources in Great Britain; and if any difference be perceptible it is in a more ochreous tone of *lychnitis*, and in the costal dark margin being distinctly more powdered with gray atoms; but local influences, in countries so widely apart, produce such slight variations, that it is presumptious to dogmatize on trivial ditinctions without long and close study. As to the larvæ of *lychnitis*, which I have from the same places, they are absolutely indistinguishable from *scrophulariæ;* and my opinion is summed up by saying that *verbasci* is a good species, but that the identity of *scrophulariæ* with *lychnitis* is likely to be proved, when any specialist has the opportunities for close and extended comparisons.—N. T. Dobree; Beverley, E. Yorks.

Late appearance of Hybernia defoliaria.—On Jan. 26th last, I bred a specimen of *Hybernia defoliaria*, the pupa of which had been kept in a greenhouse all the winter, where, although not much heat was used, it would certainly be protected from the frost, and would be quite as warmly situated as it ever could be out of doors, however mild the winter. It would appear then that this species may remain in the pupa state up to the end of January, quite irrespective of any retardation by excessively inclement weather. I may also mention that on May 4th, 1891, I took at light, here, a quite fresh specimen of *A. æscularia*.—W. M. Christy; Watergate, Emsworth, Hants.

Late appearance of Euchlöe cardamines.—In reply to Mr. Perry Coste's note on the late appearance of *E. cardamines* at Mürren, may I suggest that Mürren is 5000 ft. above sea-level, and that it is one of the commonest experiences in Swiss collecting to find insects that are mere rags in the valleys, only just emerged, a few thousand feet up. As to *Gonopteryx rhamni*, I have found it fairly abundant in more than one Swiss valley during the month of August.—R. S. Standen; 67, Earl's Court Square, South Kensington, May 10, 1891.

Coccinellidæ eaten by birds.—As a contribution to the discussion on this subject (*vide* Entom. 122), I may record that Mr. W. P. Lowe sent me the contents of the stomach of a road-runner, *Geococcyx californianus* (Less.), a female, shot by him at the Big Aroyas, Pueblo Co., Colorado, Dec. 5th, 1889. The food of this bird, as exemplified by the specimen sent, consisted of Acrididæ (grasshoppers), *Coccinella* sp., Curculionidæ (*Ophyastes tuberosus* and perhaps another allied species), and a blue-green rugose metallic fragment of an unknown insect.—T. D. A. Cockerell; 3, Fairfax Road, Bedford Park, W., May 10, 1891.

Deiopeia pulchella in the Transvaal.—In the report of the February meeting of the Entomological Society I notice that Canon Fowler exhibited a cocoon of this moth, which had been received from Lower Burmah. *Deiopeia pulchella* is to me a very old acquaintance. I have caught it in Surrey; met with it again in the Malay Peninsula; received it from Mogador; and now, at the other end of Africa, find it not at all uncommon. The time of its appearance in the Transvaal is very protracted. I first captured it at the end of September—the beginning of our summer—and now, at the end of March, it is still moderately common, principally frequenting the open and treeless veldt. Flying in the strong sunlight, I have often mistaken it for a large Lycænid, as the pale azure blue of the posterior wings is wonderfully reflected, and the red and black spots of the anterior wings during flight are scarcely, if at all, visible. Its flight is short, and it is easily captured.—W. L. Distant; Pretoria, Transvaal, March, 1891.

Pœcilocampa populi and insect vitality.—An instance of the tenacity of life in insects, and their power of withstanding extremely low temperatures, was exemplified in the case of a December moth (*Pœcilocampa populi*) which was found here by my brother, Mr. Frederick

Anderson, on Jan. 5th, in a parapet at the top of the house, frozen tightly to the lead-work in a little lump of ice. So securely was it attached that it was with great difficulty removed. It was brought to me apparently lifeless, stiff, and as a specimen, useless. I placed it, however, in a chip box, and held it to the fire for a few minutes. Upon opening the lid, I was surprised to see it had quite revived; it proved to be a fine male in capital condition, and in no way injured by the freezing and imprisonment which it had undergone.—JOSEPH ANDERSON, Jun.; Chichester.

SIREX GIGAS IN MARCH. — A specimen of *Sirex gigas* was captured at the south end of the town on March 9th, and given to me a few days after. It had been impaled with a French nail which, when extracted, left an ugly hole between the thorax and abdomen.—J. E. KNIGHTS; North Denes, Great Yarmouth.

NOTES FROM YARMOUTH.—The usual Easter Monday ramble of the Yarmouth Naturalists' Society, in which I took part, produced only one or two *Hybernia progemmaria* that had been blown into Lound Run, a small stream of water. Frequently during the day hail and rain storms were experienced. I saw a *Pieris rapæ* in the window of a restaurant, on the 31st of March, which had most probably been carried there with some vegetables when in its larval state, pupated in a safe corner, and emerged. This species seems to have started for the year on the 12th April. *P. brassicæ* was seen on the wing on 28th April.—J. E. KNIGHTS; North Denes, Great Yarmouth.

BLACK-HEADED GULL FEEDING ON INSECTS.—I can support the observation of Mr. Newstead published in your last number, by a similar one. When on the Shannon and a tributary of it near Banaglen, two years ago, I went out entomologising, and on every evening, at dusk, noticed a large number of these birds hawking about very close to the water level, and at the edge of the fringe of bullrushes and reeds, with much activity. On watching their operations I found, to my surprise, they were feeding on stone-flies and other Neuroptera, which were very numerous in crepuscular flight; and long after dusk, far into the night, when even their white plumage scarcely enabled me to distinguish the birds, they continued on the wing in active pursuit of their prey. It seemed to me an interesting illustration of adaptation to environment, as this species breeds on the islands of inland waters, and in the Bog of Allen, in two places to my knowledge, have established very extensive breeding-places on the bog, where they must miss the abundant supply of fry which is afforded by marine localities during the breeding season. There is evidence also that this gull is active in the pursuit of *Bombyx callunæ* and other moths.—W. F. DE KANE; Sloperton Lodge, Kingstown.

QUERY RESPECTING FIELD APPARATUS.—I should be obliged to readers of the 'Entomologist' for information as to the best means of conveying impedimenta necessary to the entomologist when out collecting; I mean so as to get the apparatus into as little space as possible. I think if some of our practical entomologists were to inform us of the means they adopt, they would confer a favour upon many, in addition to myself. — W. HEWETT; 12, Howard Street, York.

SOCIETIES.

Entomological Society of London.—*May 6th*, 1891.—Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. Mr. Robert A. Dallas Beeching, of 24, St. James's Road, Tunbridge Wells, Kent; Mr. H. Shortridge Clarke, of Douglas, Isle of Man; Monsieur Léon Fairmaire, of 21, Rue du Dragon, Paris; Mr. Wm. Reid, of Pitcaple, Aberdeenshire; and Mr. Nelson M. Richardson, B.A., of Montevideo, Weymouth, were elected Fellows of the Society. Dr. D. Sharp exhibited a number of eggs of *Dytiscus marginalis* laid on the sheath of a species of reed, and commented on the manner of their oviposition, which he said had been fully described by Dr. Régimbart. The Rev. A. E. Eaton exhibited a collection of *Psychodidæ* from Somersetshire, including six species of *Psychoda*, eleven species of *Periconia*, and one species of *Ulomyia*. Mr. M'Lachlan commented on the interesting nature of the exhibition. Mr. P. Crowley exhibited a specimen of *Prothoë caledonia*, a very handsome butterfly from Perak; and a specimen of another equally handsome species of the same genus from Tonghou, Burmah, which was said to be undescribed. The Secretary read a letter from Mr. Merrifield, pointing out that the statement made by Mr. Fenn, at the meeting of the Society on the 1st April last, of his views on the effect of temperature in causing variation in Lepidoptera, was incorrect; he (Mr. Merrifield) had never suggested what might happen to *Tæniocampa instabilis*, and had expressly stated that he had found a reduction of the temperature below 57° to produce no effect, whereas in Mr. Fenn's experiments the temperature must have been below 40°. The Secretary also read a letter which Lord Walsingham had received from Sir Arthur Blackwood, the Secretary of the Post Office, in answer to the memorial which, on behalf of the Society, had been submitted to the Postmaster-General, asking that small parcels containing scientific specimens might be sent to places abroad at the reduced rates of postage applicable to packets of *bonâ fide* trade patterns and samples. The letter intimated that, so far as the English Post Office was concerned, scientific specimens sent by sample post to places abroad would not be stopped in future.—H. Goss, *Hon. Secretary*.

The South London Entomological and Natural History Society. *April 23rd*, 1891.—W. H. Tugwell, President, in the chair. Mr. E. Sabel, of Clapham, was elected a member. Mr. R. South exhibited a series of *Polyommatus phlæas*, L., among which were examples of the vars. *schmidtii*, Gerh., and *eleus*, Fab., and some other interesting aberrations, together with representatives of the species from Europe, Asia and Africa. Mr. R. Adkin, *Emmelesia albulata*, Schiff., bred from pupæ received from Shetland, 1888, and stated that in 1889 four only were bred, while in 1890 upwards of twenty emerged, including var. *griseata*, Stgr., and var. *thules*, Weir. Mr. Adkin also exhibited *Cedestis gysselinella*, Dup., pupa in drawn-together fir needles; and *Lithocolletis vacciniella*, Scott, larvæ mining under side of leaves of *Vaccinium*, both species from Rannoch. Mr. Tugwell, *Larentia olivata*, Bork., from Portland. Mr. Billups, the three cabinet drawers of life-histories shown by him at the Annual Exhibition, and made remarks thereon; also pupa and imago of *Eulophus damicornis*, Kirby, bred from *Demas coryli*, L., by Mr. Symes; *Cetonia aurata*, L., showing the position of the species in the cocoon after its change from the larval stage; and on behalf of Mr. Mansbridge, galls on *Hieracium* and birch collected near Leeds. Mr. Billups expressed an opinion that the maker of the former was *Aulax hieracii*, Bouch., and probably the galls on the birch were made by a species of *Phytoptus*.

May 14th.—The President in the chair. Messrs. H. Rowland-Brown, B.A., F.E.S., of Harrow-Weald; G. Bird, of Honor Oak; F. H. Filer, of Southwark; G. W. Buffle, of Camberwell; A. E. Dewey, of Walham Green; and A. C. Forrester, of Lewisham; were elected members. Mr. Tugwell exhibited, on behalf of Mr. J. E. Robson, of Hartlepool, a box containing varieties of the underside of *Lycæna icarus*, Rott., *L. astrarche*, Bgstr., and *Vanessa atalanta*, L.; varieties of *V. urticæ*, L., *Cœnonympha pamphilus* var. *albescens*; a long varied series of *Abraxas ulmata*; also a dark *Colias hyale*, L. Mr. Tugwell also showed, on behalf of Mr. Collins, of Warrington, a dark specimen of *Aplecta nebulosa*, Hufn.; an extremely dark form of *Acronycta rumicis* var. *salicis*, Curt.; and a variety of *Leucania lithargyria*, Esp., with almost white under-wings and a strongly marked black band. Mr. Jäger, living larvæ of *Callimorpha hera*, L., reared from ova obtained from a specimen captured in South Devon, 1890. Mr. R. Adkin, *Noctua festiva*, Hb., from Forres, Isle of Unst, North Wales and Kent. Mr. Tugwell, bred specimens of *Lobophora viretata*, Hb. The Secretary read a letter from Mr. Merrifield, and extracts from his papers on the effects of temperature on the colouring of certain species of Lepidoptera, the consideration of which stood over until a subsequent meeting. Mr. Tutt contributed a paper, "Reproduction and Parthenogenesis."

The Annual Exhibition was held on April 15th and 16th, at the "Bridge House," London Bridge, S.E., and was more successful than any previous exhibition of this Society: it included all branches of the animal and vegetable kingdoms. Among the exhibitors were Messrs. Geo. Neighbour and Son, with bees, beehives and appliances. Mr. H. Moore and Mr. A. E. Cook, fine collection of nests of British and foreign wasps. Mr. Billups showed Hymenoptera, Heterogyna, and Fossorial, following in their natural order; British Coleoptera, showing most of the known families; and Diptera, and Hemiptera Homoptera. Among Mr. Billups's exhibits were three drawers showing the life-histories of various species of Lepidoptera, with the parasites, both hymenopterous and dipterous, many of which were new to Britain, and in some cases new to science; the majority of these parasites were reared by members of the Society during the past four years. Mr. Lewcock and Mr. Goodman, cases of Coleoptera. Mr. W. Manger, Exotic Coleoptera, &c. Mr. R. McLachlan, British Trichoptera, or Caddis-flies, with cases of the larvæ. Mr. W. West, Homoptera collected in 1890. The most interesting exhibits among the Lepidoptera were those of Mr. Tugwell, who showed the Sphingidæ, including fine varieties of *Deilephila galii* and *Chærocampa porcellus*; the Bombyces, fine series of varieties of *Spilosoma lubricipeda*, *S. menthastri*, and *Arctia caia*. Mr. South, the Pieridæ, showing considerable variation among the different species; fine varied series of *Boarmia repandata* and *Cidaria truncata*; the genus *Dianthœcia*; also a small collection of Micro-lepidoptera, arranged in a new, and, as suggested, more convenient method, *viz.*, side by side in series of about half a dozen specimens. Mr. McArthur, a small case illustrating the life-history of *Pachnobia hyperborea*, Zett., *alpina*, Westw.; also cases of Lepidoptera. Mr. J. H. Leech, a large collection of Palæarctic species, including Papilionidæ, Sphingidæ, and the genus *Arctia*. Mr. Gregson, a most interesting case of varieties of *Abraxas grossulariata*. A collection of Canadian species made by Messrs. A. and L. Gibb, and which had been arranged by the curator, Mr. West, were shown by the Society. Life-histories of many species were exhibited by Mr. Short, Mr. C. H. Williams, and Mr. A. J. Croker, *Phorodesma smaragdaria* and *Miana strigilis* being specially noticeable; and also by Mr. Quail, whose specimens, mounted on the natural food-plant, were much admired. Mr. Sydney Webb exhibited long series of varieties of *Vanessa urticæ* and *Abraxas grossulariata*, Mr. Hawes, varieties of Rhopalocera, and a long series of *Hesperia lineola*, including the three specimens taken in 1888, from which the species was identified. Mr. T. W. Hall, varieties of Noctuæ. Mr. J. R. Wellman, his magnificent collection of Plusiidæ and Acidaliidæ. Mr. J. T. Williams, long series of many species. Professor Stuart, examples of mimicry among Lepidoptera; and a case showing secondary sexual characters. Mr. C. B. Smith, fine series of the genus *Argynnis*. Mr. R. Adkin, the British butterflies geographically arranged, in order to show local variation; also long series of the genus *Triphæna*. Mr. S. J. Capper, a fine lot of varieties and typical specimens of *Cœnonympha davus*. Mr. C. A. Briggs, long and varied series of the Pieridæ and other groups. Mr. C. Fenn, varieties of *Tæniocampa incerta*, and examples of Tortrices. Mr. A. H. Jones, scarce British Noctuæ. Mr. J. W. Tutt, his collection of the genus *Agrotis*. Messrs. Nussey, Collins, Joy, Barker, and many others, also exhibited British Lepidoptera, while fine exhibits of exotic species were made by Mr. Jenner Weir and Mr. S. Edwards. Mr. Mosley contributed an interesting collection of insects injurious to agriculturists, &c. Botanical exhibits were made by Mr. E. Step (British lichens and mosses), Miss Billups, Miss Adkin, Messrs. A. L. Clarke, and C. S. Cooper; minerals by Mr. Russell; and Mr. M. Winkley exhibited a collection of Queensland opals, showing fossil bones, shells, &c., opalised, the whole of which were collected by Mr. T. C. Wollaston. Entomological objects under the microscope were exhibited by the undermentioned gentlemen:—Messrs. H. J. Turner, A. J. Croker, T. R. Billups, R. Adkin, E. Hinton, E. Dadswell, F. Coles, R. Macer, T. D. Ersser, A. L. Corbett, H. G. Coombs, C. S. Bouttell, J. T. Holder, H. Groves, W. West, W. B. Medland, F. Reeve, W. Gregory & Co., F. Enock, C. H. Oakden, and C. S. Cooper. In a separate room Mr. Henry Burns exhibited pond life, the enlarged image of the living object being thrown upon a screen by aid of a lantern. On each evening Mr. F. Enock delivered a lecture on "The Wonders of Insect Life, as exemplified in the Life-history of the Hessian Fly"; and Mr. G. Day lectured on "A Walk by the Sea Shore"; both of these were illustrated by means of the oxy-hydrogen lantern. Mr. George Smith, of the Sciopticon Company, also gave exhibitions of micro-photographs.—H. W. Barker, *Hon. Sec.*

Birmingham Entomological Society.—*April 6th*, 1891.—Mr. R. C. Bradley in the chair. Mr. C. J. Wainwright showed long series of *Cheilosia æstracea* and *Volucella pellucens*, the former from Somersetshire, the latter from several localities. Mr. R. C. Bradley, *Echinomyia grossa* and *fera*. Mr H. J. Sands, a piece of ebony completely destroyed by some large larvæ.

April 20th.—Rev. C. F. Thornewill, F.E.S., Vice-President, in the chair. Dr. Stacey Wilson was elected a member of the Society. Mr. R. C. Bradley showed *Lauxania cylindricornis* from Wyre Forest and *Lænea* from Trench Woods. Mr. A. Johnson showed larvæ of *Chunda lichenea*. The Secretary read a paper on "Urtication," which was communicated by Mr. R. Freer. He described the effects which the hairs of *Porthesia similis*, *Bombyx rubi*, and other Lepidoptera, in various stages, produced, and said he concluded from them that the irritation was caused mechanically and not by poison. After describing in detail the hairs of the larva of *Porthesia similis*, and referring to the hairs of *Attacus cecropia* and Pterophoridæ, he said that careful examination of all these had led him to conclude that the hairs which caused the irritation were not true hairs, but degenerate weapons of offence and defence. A discussion followed, in which Messrs. Thornewill, Pope, Harrison and C. J. Wainwright joined.—Colbran J. Wainwright, *Hon. Sec.*

Lancashire and Cheshire Entomological Society. — *May 11th.* The President, S. J. Capper, F.L.S., F.E.S., in the chair. Reports were read by the Secretaries of the District Records Committee, which showed that the lists of the various orders were progressing, but the Secretaries hoped, in order to make them as complete as possible, that they would obtain the assistance and co-operation of all entomologists who had done work in either of the two counties. A paper "On the habits of some species of the Hymenoptera-Aculeata," by Robert Newstead, F.E.S., was read, the author exhibiting several cases of Hymenoptera and two species of Bombus, *in situ*, stuck on thorns, said to be done by the butcher-bird. The President exhibited *Cicada anglica* from the New Forest. Mr. Stett, varieties of several species of *Noctua*. Mr. Day exhibited and explained a new setting board (Day and Newstead's patent), which, by the use of glass slips, it is claimed, enables the wings to be set accurately and without disturbing the scales. The next meeting of the Society will be on Monday, September 14th.—F. N. Pierce, *Hon. Sec.*

REVIEW.

Abstract of Proceedings of the South London Entomological and Natural History Society for the years 1888 and 1889. 210 pp. 1 plate. London: The Society's Rooms, Hibernia Chambers, London Bridge.

The present 'Abstract' forms a very respectable volume as regards bulk, and its contents are instructive, interesting, and comprehensive. In the Presidential Addresses will be found an exhaustive summary of the entomological events of the years 1888 and 1889, together with some observations on the additions to literature during those years. Among many notes and papers of greater or lesser importance are the following:—"Remarks on *Acidalia marginepunctata*," by R. Adkin; "Speculations on the probable origin of the genus *Anthocharis*," by T. D. A. Cockerell; "On the apparent thickening of veins in *Argynnis paphia*," by J. J. Weir; "On the probable origin of *Gonopteryx rhamni*," by J. J. Weir and T. D. A. Cockerell; "Pupation of *Chærocampa porcellus*, by R. Adkin; "Colour of *Pieris napi* chrysalids affected by surroundings," by J. J. Weir; "Remarks on breeding *Retinea resinella*," by R. Adkin; "Practical Hints on breeding Macro-Lepidoptera," by W. H. Tugwell; "Ichneumonidæ bred during the years 1887 and 1888, by members of the Society," by T. R. Billups; "Nature's Sanitary and Anti-Sanitary Services," by J. W. Slater.

Space will not permit further reference to the contents of this volume, but the items we have noticed are a fair sample, and afford evidence of the valuable work the Society is doing.

Although styled the South London Entomological and Natural History Society, we note that many of its members reside in the provinces. Probably advantages might accrue if the Society adopted a shorter title, and one more in accord with its widely distributed membership.

THE ENTOMOLOGIST.

VOL. XXIV.] JULY, 1891. [No. 338.

CUCULLIA VERBASCI AND ITS ALLIES.

BY RICHARD SOUTH.

PLATE III.

THE insect known as *Cucullia scrophulariæ* has always been an enigma to me, and I was therefore exceedingly glad to see the question of its identity brought forward by Mr. Dale (Entom. 123). In a paper on the Lepidoptera of the Isle of Corsica (Ann. Soc. Ent. Fr. 1833), Rambur discusses certain species of the genus *Cucullia* allied to *C. verbasci*. In his opening remarks upon the genus, Rambur says that it is certainly a most natural one, but that it is exceedingly difficult to distinguish the numerous species comprised therein. As it is almost impossible to separate *Acronycta psi* from *A. tridens* without reference to the larvæ of those species, so also will confusion ensue in the identification of certain species of *Cucullia*, unless one has an intimate knowledge of their respective larvæ. After referring to the errors in determination of former authors, Rambur proceeds to give a kind of monograph of the *verbasci* group of the genus, illustrated by figures of the larva and imago of each of the six species described. As the volume containing this paper may not be accessible to many lepidopterists in this country, I have had the plate reproduced by photo-lithography.

The six species of *Cucullia* allied to *C. verbasci*, treated of and figured by Rambur in his monograph of the group, may be placed in two sections as follows:—

(a)	(b)
C. verbasci, Linn.	*C. thapsiphaga*, Treit.
C. scrophulariæ, Cap.	*C. caninæ*, Ramb. (=*blattariæ*, Esp.)
C. lychnitis, Ramb.	*C. scrophulariphaga*, Ramb.

We are not, however, immediately concerned with section (b), as the species comprised therein appear distinct enough from section (a), and, moreover, have not so far been detected in Britain. The following remarks upon the insects enumerated in section (a) are mainly founded on a study of Rambur's paper:—

CUCULLIA VERBASCI (fig. 6).

The imago is so well known that it is, perhaps, unnecessary to say anything about its colour or markings.

The larva is found on all kinds of *Verbascum*, also on *Scrophularia canina*, *S. ramosissima*, and *S. aquatica*. It is the only species of *Cucullia* which seems to feed on *V. thapsus*, and also the only one which would appear to prefer the leaves to the flowers; often hides beneath the leaves, and is met with from May until about the end of August. The imago chiefly emerges in May.

Guenée gives March and April as the month for the imago; Stainton, the end of April and May; Newman, April; Kirby, April and May; Hofmann, May.

CUCULLIA SCROPHULARIÆ (fig. 1).

Compared with *C. verbasci*, *C. scrophulariæ* is always smaller, and there is more yellow and less brown in the composition of its colour; the costal margin of the fore wings is ashy brown, or, in some specimens, blackish; the black dots above the median nervure are deeper in colour and more conspicuous; the inner margin is brown, but the crescents are less whitish. The cowl or hood is bordered with reddish brown, never with red.

The larva bears a strong resemblance to that of *C. verbasci*, but it is always much smaller; there is a dorsal series of large yellow patches, upon each of which four black spots are placed; the two posterior black spots are longer, sometimes touching the black spot placed just above the spiracle; they are always united, and often also with the anterior pair, thus forming a kind of X; the four spots on the sides are rather large; the other black markings are pretty much as in *C. verbasci*. The head is deep yellow, with a frontal black mark shaped like an inverted V. It feeds on the flowers and seeds of *Scrophularia nodosa*, *S. aquatica*, *Verbascum blattaria*, and *V. blattaroides*.

The species is widely distributed, though less common than *C. verbasci*. It is found in Germany and France, rather more frequently met with in the south, occuring about the same time as *C. verbasci*.

Guenée compares *C. scrophulariæ* with *C. verbasci*, and says that it is nearly as common as that species, and occurs at the same time; this, according to him, would be March and April. Stephens, Doubleday, Stainton, Newman, and others mention May.

Duponchel (Hist. Nat. Lep. vii. pl. 124) gives two very different figures of this species; his fig. 3 represents a pale ochreous-brown insect, clouded with grey on the basal area, dotted with black on the costal area, and dashed with dark grey on the outer marginal area; there are three dark equidistant spots on the costa towards apex, and a reddish brown streak, interrupted by a double crescent mark, along inner margin. This figure bears a very strong resemblance to his fig. 4, which represents *C. thapsiphaga*. Referring to fig. 3, Duponchel says, in the third volume of his Supplement, that it was a mistake to call it *scrophulariæ*, as it really was a variety of *C. caninæ*. Staudinger, however, appears to consider that it represents *C. scrophulariæ*. The other figure referred to is given in vol. iii. Suppl. p. 37, fig. 1, and represents a dark ochreous insect, with a dark reddish-brown streak along the inner margin, and two dashes of the same colour above the middle of the outer margin. This is also referred by Staudinger to *C. scrophulariæ*.

CUCULLIA LYCHNITIS (rect. *lychnitidis*, Staud.), (fig. 3).

This species is still farther removed from *C. verbasci* than is *C. scrophulariæ*, but it is also very close to the last-named species, with which it agrees in size, but the wings are rather less broad. In colour it is of a pale reddish yellow; the costal margins of the fore wings are grey-brown, slightly tinged with reddish; the clear whitish space above the crescents, which are of the ground colour, is sometimes conspicuous; the inner marginal streak is less deep, the clear space near inner angle is larger, and the line which precedes it is well defined at this point; the orbicular is enclosed by four black dots indicating a square; the reniform is also enclosed by black dots, which vary in number from two to three on its inner side, and from four to six on its outer side. The hind wings are paler. The cowl is posteriorly bordered with ashy brown.

The larva is similar to that of *C. scrophulariæ*. Each segment has a semicircular yellow band, upon which are placed black spots; the two posterior spots, often united, are longer and more slender, frequently joining the spot above the spiracle; the two intermediate spots on the sides of the segments are also often united, forming oblique lines. A variety occurs which is almost entirely yellow, with the black spots more or less obsolescent.

Feeds on the flowers and seeds of *Verbascum lychnitis, V. sinuatum, V. nigrum*, and *V. phlomoides*.

This species assumes the perfect state much later than the other two, as it is not on the wing before July and August, according to Rambur; but in England, I think, the moth appears in June and July.

Var. (?) *rivulorum*, Guen., is larger and more ochreous in colour. It occurs in France, and the larva, which is greener in colour, is said to feed on *Scrophularia* only.

Mr. Harwood, writing of *C. scrophulariæ* in 1876 (Entom. ix. 233), pointed out that the species ought not to be confounded with *C. verbasci*, but adds that it is extremely difficult to distinguish between *C. scrophulariæ* and *C. lychnitis*; and on p. 259 of the same volume he quotes a letter received from the late Mr. Henry Doubleday in 1870, which shows that at that time few English entomologists were acquainted with the insect called *scrophulariæ*. Mr. Robson also considers that *scrophulariæ* "more closely resembles *lychnitis* than *verbasci*" (*ante*, p. 145). Between thirty and forty years ago, Speyer suggested that *lychnitis* was only a form of *C. scrophulariæ*, a view of the case which has been accepted by other continental entomologists, and Mr. Dobree's remarks upon this subject (Entom. 146) would seem to indicate that he also holds this opinion. Possibly, however, *scrophulariæ* may be a form of *C. verbasci*, and this seems the more probable when we compare Rambur's figures of the respective larvæ, and attach a due amount of importance to the facts that the larva of *C. lychnitis* feeds only on *Verbascum*, whilst those of *C. verbasci* and *C. scrophulariæ* feed on both *Verbascum* and *Scrophularia*, and the imagines of the last two emerge about the same time. Is it too much to hope that those lepidopterists who have the opportunity of conducting such investigations, will be indefatigable in their endeavour to clear away the cloud of doubt and uncertainty which seems to envelope this mysterious "shark?"

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL.

(Continued from p. 143.)

Subf. *Noctuinæ* (sens. str.).

Agrotis puta, Hb., Hampstead; Bishop's Wood; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill, at sugar (*South*); Harefield (*Wall*); Chiswick (*Sich*). *A. ypsilon*, Rott., = *suffusa*, Hb., Hampstead; Clutterhouse Lane (*Godwin*); Mill Hill, at sugar (*South*); Hammersmith (*Mera*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick (*Sich*). *A. saucia*,* Hb., Hampstead, some seasons scarce, others in dozens (*Godwin*); Mill Hill, at sugar (*South*); Chiswick (*Mera*). *A. segetum*, Schiff., Mill Hill (*South*); Tufnell Park (*Shepherd*); Hampstead (*Watts*); Harefield, usually common (*Wall*); Chiswick (*Sich*). *A. exclamationis*, L., generally distributed (*Godwin*); Mill Hill (*South*); Bedford Park (*Miss E. Sharpe*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Dalston (*Prout*).

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* *A. saucia* is placed by Prof. J. B. Smith in the genus *Peridroma*, Hb.

A. corticea, Hb., South Hampstead, common (*Watts*); Clapton (*Bacot*). *A. nigricans*, L., very abundant, Elgin Road (*Godwin*); Mill Hill (*South*); Holloway (*Shepherd*); Hammersmith (*Mera*); South Hampstead (*Watts*); Chiswick, once (*Sich*). *A. tritici*, L., Mill Hill, at sugar (*South*); Chiswick, occasionally (*Sich*). *A. strigula*, Thnb., Harefield, one taken, 1887 (*Wall*).

Noctua glareosa, Esp., Bishop's Road, at sugar, rare (*Godwin*). *N. augur*, Fb., Mill Hill, at sugar (*South*); Highgate (*Mera*); Hampstead (*Watts*); Harefield, common (*Wall*). *N. plecta*, L., on lamps, Finchley Road; Willesden (*Godwin*); Mill Hill (*South*); Bedford Park (*Miss E. Sharpe*); Hammersmith (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*). *N. c-nigrum*, L., on lamps, Finchley Road; Willesden (*Godwin*); Mill (*South*); Hammersmith (*Mera*); Harefield, taken rarely (*Wall*); Clapton (*Bacot*); Chiswick, larva on dock (*Sich*). *N. ditrapezium*, Bork., Bishop's Wood (*Godwin*). *N. triangulum*, Hufn., Bishop's Wood; Kingsbury, Old Oak Common, fairly common at sugar, more so on lamps (*Godwin*); Mill Hill, at sugar, and larvæ on sallow (*South*); Harefield (*Wall*). *N. brunnea*, Fb., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Highgate (*Mera*). *N. festiva*, Fb., Bishop's Wood; Fulham; Old Oak Common (*Godwin*); Mill Hill (*South*); Highgate (*Mera*); Harefield, very common (*Wall*); Chiswick, at sugar (*Sich*). *N. rubi*, View., Bishop's Wood (*Godwin*); Mill Hill—in some seasons there are two broods, one appearing in June and the other in August, the individuals in the later brood are more numerous, but smaller in size—(*South*); Hampstead, common (*Watts*); Harefield, taken rarely (*Wall*); Stamford Hill and Tottenham dist. (*Prout*); Chiswick, at sugar (*Sich*). *N. umbrosa*, Hb., Finchley Road; Kilburn (*Godwin*); Mill Hill (*South*). *N. baia*, Fb., Mill Hill, at sugar (*South*); Highgate (*Mera*); Harefield (*Wall*). *N. castanea* var. *neglecta*, Hb., Bishop's Wood, fairly common (*Godwin and Shepherd*). *N. xanthographa*, Fb., generally distributed (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bedford Park (*Miss E. Sharpe*); Bishop's Wood (*Shepherd*); Highgate (*Mera*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick, abundant, larva under stones, &c., in spring, eats *Rumex*, *Poa annua*, &c. (*Sich*).

Triphæna ianthina, Esp., Bishop's Wood; Clutterhouse Lane; Old Oak Common (*Godwin*); Mill Hill (*South*); Isleworth (*Meyers*); Highgate (*Mera*); Harefield (*Wall*); Chiswick, larva in spring (*Sich*). *T. fimbria*, L., Bishop's Wood, larvæ plentiful; Clutterhouse Lane; Old Oak Common, rare (*Godwin*); Mill Hill (*South*). *T. interjecta*, Hb., Mill Hill, at sugar and at honey-dew (*South*); Chiswick, occasionally (*Sich*). *T. comes*, Hb., generally distributed* (*Godwin*); Mill Hill* (*South*); Bedford Park (*Miss E. Sharpe*); Bishop's Wood* (*Shepherd*); Highgate* (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Clapton* (Bacot); Chiswick, larva on primrose, &c. (*Sich*). *T. pronuba*, L., generally distributed (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bedford Park (*Miss E. Sharpe*); Bishop's Wood (*Shepherd*); Highgate (*Mera*); South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*).

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* *Cited in the MS. list as* orbona.

Subf. *Amphipyrinæ*.*

Amphipyra pyramidea, L., Bishop's Wood, common; Clutterhouse Lane; Kingsbury (*Godwin*); Mill Hill, at sugar (*South*); Harefield (*Wall*). *A. tragopogonis*, L., Clutterhouse Lane; Old Oak Common; Fulham, rare (*Godwin*); Mill Hill, at sugar (*South*); Isleworth (*Fenn*); Bedford Park (*Fenn*); Tufnell Park (*Shepherd*); Harefield, frequent (*Wall*); Clapton (*Bacot*); Chiswick, larva on *Galium aparine* (*Sich*).

Mania typica, L., generally distributed (*Godwin*); Mill Hill (*South*); Bedford Park (*Ckll.*); Tufnell Park (*Shepherd*); Hammersmith (*Mera*); larvæ very abundant at South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Dalston (*Prout*). *M. maura*, L., Bishop's Wood; Clutterhouse Lane; Old Oak Common; Fulham; Regent's Park; Kilburn (*Godwin*); Mill Hill (*South*); Isleworth (*Miss Cooper* fide *Fenn*); Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick, larva once in spring (*Sich*).

Subf. *Orthosiinæ*.†

Pachnobia rubricosa, Fb.,‡ Mill Hill, at plum blossom (*South*); Chiswick, at sallow (*Sich*).

Tæniocampa gothica, L., generally distributed (*Godwin*); Mill Hill, at plum blossom (*South*); Hammersmith (*Mera*); Hampstead (*Watts*); Harefield (*Wall.*); Chiswick, at sallow (*Sich*). *T. incerta*, Hufn., generally distributed (*Godwin*); Mill Hill, at plum blossom (*South*); Bishop's Wood (*Shepherd*); Hammersmith (*Mera*); Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick, at sallow, larvæ on nut, willow, and hornbeam (*Sich*). *T. populeti*, Fb., Rickmansworth (*South*). *T. stabilis*, View., generally distributed (*Godwin*); Mill Hill, at plum blossom (*South*); Hampstead (*Watts*); Harefield (*Wall*); Chiswick, at sallow (*Sich*). *T. gracilis*, Fb., Mill Hill, at plum blossom (*South*); Harefield, frequent (*Wall*); Chiswick, at sallow (*Sich*). *T. miniosa*, Fb., Bishop's Wood (*Godwin*). *T. munda*, Esp., Bishop's Wood, common (*Godwin*); Mill Hill, at plum blossom (*South*); Harefield (*Wall*). *T. pulverulenta*, Esp., generally distributed (*Godwin*); Mill Hill, at plum blossom (*South*); Bishop's Wood (*Shepherd*); Hampstead (*Watts*); Harefield (*Wall*).

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* Grote classes *Amphipyra*, which he calls *Pyrophila*, Hubn., in the tribe *Caradrini*.

† Including the *Cosmiidæ* of Guenée.

‡ Perhaps a *Tæniocampa* rather than a *Pachnobia*.

Orthosia upsilon, Bork., Fulham; Hammersmith Marshes, site of Addison Road Station; Kensal Green; Clutterhouse Lane (*Godwin*); Mill Hill (*South*); Tufnell Park (*Shepherd*). *O. lota*, Clerck, Bishop's Wood; Clutterhouse Lane; Hammersmith; Kingsbury (*Godwin*); Mill Hill, at sugar on juniper and yew bushes (*South*); Harrow, 1881 (*Watts*); Harefield (*Wall*); Chiswick, larva on willow (*Sich*). *O. macilenta*, Hb., Bishop's Wood; Clutterhouse Lane (*Godwin*); Mill Hill, at sugar on juniper and yew bushes (*South*); Highgate (*Shepherd*); Chiswick (*Mera*); Harefield (*Wall*).

Anchocelis rufina, L., Bishop's Wood (*Godwin*); Harefield, once taken by Mr. Kennell (*Wall*). *A. pistacina*, Fb., generally distributed (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Highgate (*Shepherd*); Hammersmith (*Mera*); Harefield (*Wall*); Chiswick, once (*Sich*). *A. lunosa*, Haw., generally distributed, at lamps (*Godwin*); Mill Hill (*South*); Highgate (*Shepherd*); Hammersmith (*Mera*); larvæ at South Hampstead (*Watts*); Harefield (*Wall*); Clapton (*Bacot*); Chiswick, larva obtained by sweeping grass in March (*Sich*). *A. litura*, L., generally distributed (*Godwin*); Mill Hill (*South*); Harefield, common (*Wall*); Chiswick, larva on sorrel (*Sich*).

Cerastis vaccinii, L., Bishop's Wood, common (*Godwin*); Mill Hill, at sugar on juniper and yew bushes (*South*); Highgate (*Shepherd*); Harefield, very abundant (*Wall*). *C. spadicea*, Auctt. Angl. = *ligula*, Esp., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Highgate (*Shepherd*); Harefield (*Wall*).

Scopelosoma satellitia, L., Bishop's Wood, common; and generally distributed (*Godwin*); Mill Hill (*South*); Harefield (*Wall*); Chiswick (*Sich*).

Oporina croceago, Fb., two specimens at sugar, Old Oak Common, 1875 (*Godwin*).

Xanthia citrago, L., Mill Hill (*South*); Highgate (*Shepherd*). *X. fulvago*, L., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Harefield, common some seasons (*Wall*). *X. flavago*, Fb., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Harefield, common some seasons (*Wall*). *X. aurago*, Fb., Mill Hill (*South*); one specimen at South Hampstead (*Watts*); Harefield, taken sparingly (*Wall*). *X. gilvago*, Esp., Mill Hill (*South*); Harefield, two taken, 1889 (*Wall*). *X. circellaris*, Hufn., Bishop's Wood, common (*Godwin*); Mill Hill (*South*); Highgate (*Shepherd*); Harefield, abundant (*Wall*).

Cirrhœdia xerampelina, Hb., Clutterhouse Lane, a larva under moss on ash (*Godwin*); Mill Hill *South*).

Tethea subtusa, Fb., Willesden Lane; Neasdon, rare (*Godwin*); Mill Hill, at honey-dew on plum trees (*South*); Hammersmith (*Mera*); South Hampstead, common in garden, 1875, &c., not seen since 1880 (*Watts*). *T. retusa*, L., Mill Hill, at honey-dew on plum trees (*South*).

Cosmia paleacea, Esp., Highgate Woods, 1870 (*F. Bartlett*, Entom., 1878, p. 104).

Dicycla oo, L., one larva near Ealing (*Mera*).

Calymnia trapezina, L., generally distributed (*Godwin*); Mill Hill (*South*); Isleworth (*Fenn*); Bishop's Wood (*Shepherd*); near Acton (*Mera*); Hampstead (*Watts*); Harefield (*Wall*); Dalston (*Prout*); Chiswick, larva on oak, holly, &c. (*Sich*). *C. pyralina*, View., Mill Hill, at sugar, also bred (*South*). *C. diffinis*, L., Clutterhouse Lane; Bishop's Wood (*Godwin*); Mill Hill (*South*); near Acton (*Mera*); Harefield (*Wall*). *C. affinis*, L.,* West Hampstead (*Godwin*); Mill Hill (*South*); Isleworth (*E. M. Fenn* fide *F. G. Fenn*); Highgate, 1865 (*Shepherd*); near Acton (*Mera*); Hampstead Heath, Aug. 20th, 1881 (*Watts*); Harefield, not common (*Wall*); Chiswick (*Sich*).

(To be continued.)

ENTOMOLOGY OF GRANADA AND NEIGHBOURHOOD.

By the Rev. F. A. Walker, D.D., F.E.S.

My chief places of resort at Granada, in the pursuit of Entomology, were the beds of dry water-courses situate between the Alhambra Hill and the Campo Santo. The steep craggy banks by which these water-courses were hemmed in, to a height of twelve or fifteen feet, rendered the locality warm, sheltered, and therefore suitable for the purpose. I likewise visited the olive groves left and right of the said channels for the winter floods from the Sierra Nevada, those to the left consisting of steep slopes, while those to the right were situate on much more level ground. The undergrowth of these olive groves consisted of a varied and luxuriant flora of borage, echium, field poppy, corn marigold, wild camomile, a deep pink convolvulus, &c. These species were by far the most abundant, and in addition may be enumerated the less frequent but also plentiful occurrence of variously coloured vetches, two species of mignonette, star of Bethlehem, wild coreopsis and antirrhinum, with many more.

Following the road from the Alhambra Hill to the cemetery, *Xylocopa violacea*, the commonest species of all the Hymenoptera there, with the exception, as a matter of course, of *Apis mellifica*, might be noticed humming noisily round the blossoms of the white acacia trees, which were just in perfection during the first fortnight of May, a period of glorious weather. The rose and purple acacias on the Alhambra terrace were likewise affected by this bee, but these varieties are far less common than their white congener. As regards Vespidæ, our own *Vespa germanica* was observed, as a rule, every day, but would not appear to be plentiful. Probably the two commonest kinds were (1) the slight and elegant *Polistes gallicus;* the length of the legs of this species is remarkable, and very observable when flying); and (2), *Dielis aurea*, about the size and shape of our commonest wasp, but with the yellow replaced by a rust-coloured tint. The flower on which I captured most of the last-named species was a chrysanthemum or marguerite in the large and picturesque garden of the Villa Calderon, whose owner, the Marquis Pallavicini, is an absentee residing in Genoa. Ants (of three or four species) were most abundant, and it was a very common sight to see dead leaves and fallen blossoms of the white acacia toppling about as if bewitched, or moving erect, like the sail of a boat, owing to an ant pertinaciously grasping one end, and so dragging them along. In respect of Neuroptera, the commonest species was *Libellula depressa*, of which more specimens of the female were observed than of the male. The chief locality for this insect was a ditch of swiftly-flowing water, overhung in places by dog-roses, brambles, and honeysuckles, by the side of a road that diverged to the left of the road mentioned above, at a point about half-way between the Alhambra and the cemetery; in fact, *L. depressa* was practically the only dragon-fly, as the genus *Lestes* was only represented among my insects by two specimens, one that I captured, and the other given to me, and I do not remember seeing any more. Three or four specimens only of a species of *Æschna* were observed, one flying backwards and forwards along the bed of the dry water-course, a second above the reeds and mud of an old Moorish reservoir in the side of the hill. These two, as far as I could judge, were of a uniform dun-colour, with a tinge of blue about the thorax. Two more had a body of a uniform lavender-blue, of very much the same colour as the male of *depressa*, and, I believe, with a little green and yellow about the thorax. These two last were flying around the trenches and remaining relics of the Moorish waterworks or forts at the top of the hill, not far from the Sella del Moro, or Seat of the Moor, the brick-walled platform where Boabdil is traditionally reported to have mourned as he took a last bird's-eye view of the glories of his departing kingdom, one of the fairest prospects on earth; Granada and its Vega outspread beneath. Whether the above-named specimens of *Æschna* were two different kinds, or the two sexes of the same kind, is more than I can say; they were far too restless, as well as swift on the wing, to admit of being caught, and were, I should judge, rather smaller in size than our common *Æschna cyanea*, probably *mauricianus*. Other tribes of Neuroptera were likewise to all appearance scantily represented. I took one specimen of *Sialis lutaria*, and one of *Chrysopa*.

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* Mr. South has taken all the four species of *Calymnia* on one night.

Among the Coleoptera may be mentioned *Clythra vicina* (which was very common), *Œnas crassicornis*, and *Trichodes octopunctatus*. These beetles used to cluster on the leaves and shoots of the bramble on a bright and hot day. *Oxythyrea stictica* and *Cetonia squalida* and *hirtella* were also common. I secured a few specimens of *Cetonia aurata* on flowers in the garden of the Villa Calderon, two or three specimens of the genus *Telephorus* from flowers under the olive groves; one or two specimens of *Scarabæus sacer* that were crawling around refuse in the road; one or two examples of *Silpha* on a singularly beautifully-marked, but dead and well-nigh putrid, lizard near the Seat of the Moor; an immature representative of a species of *Lacerta* that reaches a very large size. The most abundant kind of all was a dark beetle with a red thorax, on the flower of the wild camomile, and which I have since ascertained to be *Heliotaurus ruficollis*.

In taking a review of the Diurnal Lepidoptera, several of our common British species were observed, but could not be pronounced abundant. For example, on a fine and hot morning one or two specimens of *Pieris brassicæ*, *Epinephele ianira*, *Satyrus megæra*, *Vanessa urticæ*, *V. cardui*, and *Chrysophanus phlæas* might be seen; *P. rapæ* even more rarely. *V. atalanta* was occasionally seen, but high up, as a rule, amid the elms of the wood that covers the Alhambra Hill. During the first few days of May, *V. cardui* was only represented by worn, hybernated specimens, but before the close of the month I noticed two or three examples, fresh and in good condition. *Papilio machaon* and *P. podalirius* were seen and captured, but neither of these two butterflies were common. Of *Colias hyale* I saw and took one solitary specimen. *Colias edusa* and *Euchloë eupheno* were fairly common, I mean so far as seeing two or three specimens of each nearly every day. The former species was, I think, rather commoner at Langaron (a place famed for its mineral waters, four hours distant from Granada by diligence, and on the south side of the Sierra) than at Granada, which is on the north; a bridle-road leads from its rocky fastnesses and ravines, its terraces crowned with wild broom, Spanish chestnuts, and walnuts, to the ancient and classic Carthagena. Shortly before I left Granada *Arge thetis* was coming out in full force, but did not prove very easy to capture, as it flits restlessly up and down the rocky banks, and is consequently difficult to approach over the loose stones of the steep slopes without startling the insect.

The commonest species of butterflies in May were *Pieris daplidice*, two species of fritillary (genus *Melitæa*), and *Polyommatus alexis*. *Satyrus mæra* and *S. meone* were also noticed, but, as far as capturing was concerned, were only represented each by a single specimen. Two other species of Satyrid, one represented by a single specimen and the other by three, were taken, and three out of the said four on the highest ground in the neighbourhood, namely, around the above-mentioned Moorish remains at the top of the hill. Of *Gonepteryx rhamni* I saw only one male on the banks of the Darro in the outskirts of Granada, and one female near the Sella del Moro, but failed to capture either. I was credibly informed that two or three *G. cleopatra* could be taken a day, at a place nine miles from Granada by following up the course of the Genil, famed for its numerous gentians, fields of forget-me-nots, and wild peonies. One noticeable particular, in respect of the flora of Andalusia, is the number of our well-known garden flowers that flourish perfectly wild in Southern Spain.

As regards Heterocera, one of the commonest and certainly the largest species was *Saturnia pyri*, of which I had several specimens offered me, some of them by the guards of the Alhambra, and could doubtless have had many more.

Diptera did not seem to be common, one or two kinds of *Eristalis* alone excepted. Genera *Syrphus* and *Tabanus* were noticed, but by no means in abundance.

Among Hemiptera the frequent occurrence of *Lygæus militaris*, familiar to the traveller in Syria and Palestine, may be mentioned.

In the class Orthoptera, *Gryllotalpa vulgaris*; and such grasshoppers as were seen (principally *Decticus*, sp. incert., *Mantis religiosa*), had, of course, as yet their wings mostly undeveloped.

At Tangiers, on Wednesday, June 3rd, I succeeded in catching nine *Satyrus meone* between 8 and 10 a.m.; also specimens of *Silpha* and *Scarabæus sacer*. Locusts, mostly dead, but a few still living remnants of the recent plague, whereby the crops were destroyed, were to be met with in the hedgerows (*Acridium peregrinus*).

At Gibraltar, June 4th, one specimen of *S. meone*.

(To be continued.)

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. Perry Coste, F.C.S., F.L.S.

(Continued from p. 139.)

V.—The Chemical Aspect (*concluded*).

K.

Addendum, on experiments with the Cyanide Reaction.*

Before commencing my remarks on the Biological Aspect, I must redeem the promise to detail my further experiments with *C. edusa* and the cyanide bottle. To refresh the memory of my readers, I may remind them that, having expressed myself very sceptically as to this extraordinary transformation (Entom. xxiii. 129), I was advised by Mr. Cockerell to try again with a *warm*, damp cyanide bottle (Entom. xxiii. 20). To this I replied next month (Entom. xxiii. 234), stating that this hint had been acted upon, but still without effect, and promising details in due course. These details I will now briefly give.

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* It will be understood, as already stated, that this subsection was originally written for a footnote to the December issue of the 'Entomologist.'

In a very damp cyanide bottle I placed two wings of *C. edusa*, and also, for comparison, two of *G. rhamni;* one wing of each was placed *on* the cyanide, and one pinned to the cork. The bottle was placed for 2½ hours on the ledge of a gas-stove (burning 15 ft. per hour), and 1½ in. in front of the flame. But directly I read Mr. Cockerell's remark about the *warming* being necessary, it occurred to me as highly probable that the cyanide had nothing to do with the matter, but that heat alone would be equally efficacious. I therefore made a blank experiment by placing in a similar bottle a wing each of *edusa* and *rhamni* (pinned to the cork), this second bottle being placed side by side with the cyanide bottle, and exposed for the same length of time, and under precisely similar conditions. Now as to the results: in the cyanide bottle, after twenty minutes, the *edusa* wing *on* the cyanide was chiefly white! and, after forty minutes, entirely so, this being no other than the usual solvent effect of cyanide solutions and most other reagents on this species. As to the wing pinned on the cork, it became somewhat *brownish;* and, on washing it after the expiration of the 2½ hours, all the pigment was washed away, together with the adhering cyanide which had splashed up,—an exceedingly natural result. *G. rhamni* was affected in pretty much the same way. At present, then, I was as far as ever from getting Mr. Edwards' red. As to the wings in the empty bottle, they were *absolutely unaffected;* so that clearly *mere heat* has *nothing* to do with the matter. But still I did not rest here; there seemed a possible objection that might be made, *viz.*, that the heat of the gas-stove was too great, and a gentle but prolonged warmth was necessary. So I placed fresh wings of *edusa* and *rhamni* in the cyanide bottle, both *on* the cyanide and pinned to the cork, and kept this bottle in a water-oven, where for eight or nine hours daily it was exposed to a temperature of 100° (=212° F.). After eight days of this treatment the wings on the cork were absolutely unaffected, while the *edusa* wing on the cyanide was turned brownish as before. I therefore put the matter aside as hopeless. (I might add that an empty bottle containing similar wings, both pinned to the cork and resting on the bottom, was similarly treated, and, of course, with wholly negative results.)

Addendum, December 5th.—The above was written on Nov. 4th, since when, however, I have—at last—succeeded in entirely clearing up the discrepancy between Mr. Edwards' results and my own. I will be as brief as possible in stating the nature of my new discovery, and the more so since, beyond recounting the one or two startling facts, little can be said until a thorough investigation shall have been made by means of an extended series of experiments in this new direction.

Briefly, then, the cyanide bottle, referred to above, after its eight days' sojourn in the water-oven, had been placed on one side for several months. At the beginning of November—in fact, just after finishing the MS. of the foregoing pages—I thought it as well, by way of special precaution, to give a final look to the wings before throwing them away. The *edusa* was brittle and browner (dull gingerbread colour), as in the experiments made on the gas-stove (*supra*); but, to my intense astonishment, I found on the *rhamni* wing what looked by gaslight like *red* spots. A subsequent examination by daylight failed to confirm this, but, of course, the matter was far too important to rest here. Accordingly, I started a fresh set of experiments by placing wings of *edusa* and *rhamni* in (1) an ordinary (collector's) cyanide bottle, and (2) in a bottle containing *only* a mass of potassic cyanide, on to which I poured some water, so that the cyanide was, in places, in a *sloppy* condition. (I should state that similar *simple*, not shop-made, cyanide bottles were used in the previous experiments.) On examining the cyanide bottles after sixty hours I found that in the wet one the *rhamni* wings were *largely reddened*, the red being, perhaps, most like a fresh blood stain,—a most indubitable red certainly. Microscopic examination showed that there was no possible delusion about the matter; each individual scale could be seen bright red, whilst the additionally interesting fact was disclosed that the red shaded off into orange at its border. Here, then, we have actually in progress, before our very eyes, the (progressive) evolution of red from yellow *viâ* orange. I may add that these metamorphosed wings were removed to a dry glass slide, and have already retained their colour for four weeks.*

The *edusa* wing was less satisfactory; it was chiefly a sort of brownish, but I could not thoroughly decide whether or not there was a purplish tint also. It was accordingly replaced in the cyanide bottle, and after another forty-eight hours there could be no longer doubt as to the *red blotches* on the wing, which, however, was to a great extent transparent. The effect was not by any means so marked and striking as in *rhamni*, but I wish it to be definitely understood that a red *was* produced. Seeing, however, that the *rhamni* effect was so much better (and remembering also that Mr. Edwards' result was not obtained on *edusa*, but on *eurydice*), it seemed to me likely that better effects might be got with such a tint as that of *hyale*, with which accordingly I experimented next. I succeeded in obtaining red spots, but not to any great extent.

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* They are still red, June 24th, 1891.

After this, as will be readily understood, I hasten to retract *in toto* my previous scepticism on this subject, and to recant any or every disparaging remark that I may have uttered on the possibility of converting yellow to red artificially; and at the same time I have the very pleasant duty of expressing my sense of the heavy indebtedness under which I lie to Mr. Cockerell for having drawn my attention to Mr. Edwards' statement, and made the further suggestions concerning wet cyanide. My own experiments having been originally planned entirely with *solutions*, it is highly improbable that I should ever have tried a solid, or rather sloppy solid, reagent but for Mr. Cockerell's tenacity in backing up his authority; and therefore I feel that, but for this, I should in all probability have missed the interesting prospect opened up by these new results. At the same time, I may point out that there is reason for surprise at the solution of cyanide failing to produce a red; for even the wet cyanide exerts a considerable *solvent* effect on the pigment, and in the case of the solution—as my readers already know—such solvent action is rapid and complete: under such circumstances there was obviously no time or room for the reddening.

With regard to the new field thus opened out for work, I can promise my readers that it shall be neither neglected nor undervalued; the whole question must be thoroughly and carefully worked out, and already sets of experiments are in progress, and others planned, to this end. Doubtless, before very long, the 'Entomologist' will hear from me on this subject.

In conclusion, I seem bound to say a word as to the bearings of this discovery on my previous interpretations. It will, of course, be understood that it is impossible to make any definite statement, scarcely even to hazard a provisional explanation, on the strength of two or three experiments. However, at present I can see nothing here inconsistent with my theories on these pigments, but, on the contrary, it looks not unlike a confirmation from another side of my conclusions, while especially one may hope that some more definite light may be thrown on the phenomenon, of which an explanation was offered at the conclusion of Subsection F. The statement, however, that *no progressive* metamorphosis can be effected must, of course, go; but, barring this, I think it will be found that there is nothing in these fresh results incompatible with the views expressed on pp. 370, 371, but rather we have here an *ascending* confirmation of explanations founded originally on *descending* experiments. The very uniqueness of (solid) cyanide as a reagent confirms the view, that in all other cases we have retrogressive results,—results wrought by those same reagents which we *know* to retrogressively affect natural reds.

I may add that *heat* has nothing whatever to do with this cyanide reaction, since the above results were obtained in the cold. With regard to the chemistry of the reaction, my own notion is that probably the red is produced by a combination of the cyanogen radicle with the yellow pigment; but all speculation of this sort is better left for the future. It will, of course, be understood that the views suggested by this reaction are scarcely more than hinted at here; a fuller discussion of thewhole subject is reserved for a later date.*

VI.—The Biological Aspect.

This concluding section will be, as I have already stated, very brief, since it is intended chiefly to draw attention, by quoting a few examples, to the connection between my artificially prepared varieties and those found naturally occurring; and my acquaintance with the literature of "varieties," as well as with large collections, is far too slight to allow me to go much beyond general suggestions.

First of all, however, it is necessary to refer to one question—of some considerable interest—that is naturally suggested by any account of chemical experiments on insect colours; the question, I mean, as to what influence the chemical nature of the soil or food, and even temperature, may have on the colours of insects in the natural state. There is, of course, a general impression among entomologists that such influences may account for a large percentage of variation, especially when in any one district such variation is in one general direction; for instance, I quoted, in the last section,† Dr. Seitz's statement that in one restricted forest area of Brazil all the species of insects showed a great tendency to blue coloration: Wallace, too, remarks‡ that "in Tropical Africa we find two unrelated groups (in the Nymphalidæ and Papilionidæ respectively) characterised by a prevailing blue-green colour not found in any other continent," these groups being *Romalesoma* and *Euryphene*, and *Papilio zalmaxis* and several of the *P. nireus* group. And again, Wallace§ states that "species of totally distinct groups are coloured alike in one district, while in another district the allied species all undergo the same change of colour. The most probable cause for these simultaneous varieties would seem to be the presence of peculiar elements or chemical compounds in the soil, the water, or the atmosphere, or of special organic substances in the vegetation; and a wide field is therefore offered for chemical investigation in connection with this subject."

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* May, 1891. Since writing the above I have made various further experiments, details of which I, however, reserve for the present. Still, I may say that the reddening effect has been obtained with several other yellow species, all of which belong to the Rhopalocera. I have succeeded in reddening no yellow moth yet, neither have I found a similar reaction to occur with any other nitrogenous compound besides potassium cyanide.

† Entom. p. 138, *supra*.

‡ 'Tropical Nature,' p. 256.

§ I do not remember whether Wallace expressly ascribes this phenomena to any supposed local chemical influences or not.

Now, *à priori*, this is undoubtedly a very taking explanation, and it is one that I adopted with great enthusiasm at the commencement of my experiments, expecting them, indeed, to throw considerable light thereupon;* but I must admit that I have by no means so much faith in the principle now; indeed, I should incline—so far as I can see any data for forming an opinion at all—to ascribe to it exceedingly limited efficacy. Of course, I am very conscious of the fact that there is a vast difference between experimenting by external reagents on the colours of dead insects, and experimenting by means of food, that is, by reagents internally administered to living insects, and leading to we know not what modifications of their metabolic processes; but nevertheless, I think that the results of my experiments do give us sufficient insight into the relations of the various colours to make a cautious argument to the living processes legitimate. Here I may recall the speculations that were referred to in the second section of these articles;† for—as was then pointed out—if it had been found that certain reagents produced one coloric change, and certain others quite another, and so on, *then* we should have had considerable reason to suppose that some change in the constituents of the food, the presence of some unusually large proportion of one organic acid, *e. g.*, or of some unusual body. as, for instance, hydrocyanic acid in the peaches and almonds, might lead to some colour variation; but as it is, the experimental results give no support at all to such views; and the fact that chemically the most opposite compounds produce a similar effect on the colours has made me very sceptical as to the potency of variation in food to cause *any marked* coloric change. I would not be understood to deny such influence *in toto;* for instance, it is stated—and, I suppose, on sufficiently good authority—that dark varieties of *A. caia* may be obtained by feeding the larvæ on walnut leaves, and again, that good varieties may be got by feeding on plants standing in salt water; but I doubt if any *great* coloric change will be obtained by any such direct means. Let us look a little deeper into the question; we have three classes of colours, *viz.*, the physical, the soluble pigmental colours, and the "reversible" pigmental. Now, as to the physical colours, any direct chemical action of the food‡ on these is out of the question, and my scepticism concerning the efficacy of the first to cause coloric variation is strengthened in no small manner by the fact that so many of the instances that are quoted by writers to support that view are really instances of *physical* colour; for instance, the blue-green referred to by Wallace above is probably one of the physical colours,—in the case of *P. niveus* certainly so; and, with regard to the general variation towards blue observed by Dr. Seitz—well, my readers may judge for themselves how heavy are the odds against any blue being a pigment colour. Again, Wallace remarks that the Lepidoptera of the Philippine Islands are characterised by the prevalency of *metallic* markings: here is a clear local idiosyncracy, but these metallic markings are physical, not pigmental. In the next place, taking the soluble pigment colours, chestnut and yellow, it does not seem eminently probable that any difference of food could lead to a *disappearance* of these colours, that is, to a *white* variety. It therefore seems to me that the region for this hypothetical action of the food is greatly narrowed, being, indeed, reduced to the following peculiarities: that yellow or chestnut may develop the progressive variation red, that red may (retrogressively) stop short at yellow or chestnut, that green may stop short at yellow, or finally—a very bold speculation—that a pigment, which ought to develop as green, may—so to speak—take another road after reaching yellow, and thence develop as red (or *vice versâ*). If, therefore, anybody chooses to believe that within this restricted province coloric variation is caused by abnormalities in the food, there is nothing in my results or the deductions therefrom to directly contradict such view; but at the same time, I am not aware of any evidence at all in its favour. Nevertheless, in thus saying, I would not wish to express at all so complete a scepticism as to the influence of the food in producing *slight* differences, *e. g.*, in depth or shade of colour, and so on; but I certainly demur for the present to ascribing much to this factor.

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* *Cf.* Entom. 1890, p. 156. † *Cf.* Entom. 1890, pp. 156, 157.

‡ I am confining myself to the question of the chemical influences of the food, since it seems clear that any chemical idiosyncracies of the soil or the water would only act *viâ* the food—*viz.*, by affecting that. I will refer to the atmosphere and temperature effects directly.

Now to state my own view—I should rather incline to look upon the whole affair as a matter of indirect influence; instead of ascribing any given coloric variety to the presence or absence of a definite chemical constituent in the food, I should suggest whether the varying totality of conditions of the environment generally, may not act by more or less damaging the normal equilibrium of the insect's constitution: the various metabolic processes we know are in the highest degree plastic, and it would be easily intelligible that any unusual factor in the surrounding conditions should react on the constitution, and so *indirectly* lead to modifications in the pigments, &c., produced. An advantage of this explanation would be that we could include in it *all* varieties in pigmental colouring,* whether produced by food or even by climatic conditions. To begin with, I should incline t explain all cases of *retrogressive* variations by want of food o generally unhealthy conditions; pigments, it must be remembered, are physiologically waste products, and I could count upo the support at least of such authors as Geddes and Thomson fo the view that when nutrition is low the profusion of katobolis is much diminished, and little or no pigment produced. If, the it should appear that an atmospherically unfavourable season, o the proximity of factories, tended to produce any (retrogressive varieties, such facts would be easily explicable, just as much as similar production of varieties by bad or insufficient food. I will, I think, appear upon examination that several argument converge to support this view, and, first of all, I will point ou that most of the varieties chronicled seem to be *retrogressiv* ones, the commonest of all, *viz.*, yellow varieties of red species being clearly such: of the progressive varieties I will speak anon

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* It is as though—if I may use the simile—we should, after looking though a kaleidoscope, give it a good shaking; it is quite certain that this treatment would "affect the constitution" of the kaleidoscope, and lead to a new pattern being produced; but we are quite unable to prophecy any definite or particular path.

Now, one fact that has appeared to me to possibly suppor this position, is the variation of *Colias edusa* to *helice*. Thi white variety is, I believe, confined to the female; and if w consider that pigments imply "waste energy," that they are nearl always more abundant and richer in the male than in the female it does appear to me as not impossible that such varieties as *helic* may betoken a deficiency of katobolic energy, that, in short, the may be a starvation phenomenon; that such phenomena shoul occur exclusively in the female would be due to the fact that i the female there is always less surplusage of katobolic products and that, therefore, the pigment is more likely to fail them tha the male.*

(To be concluded.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

Notodonta trepida at Electric Light.—I beg to report the captur of a specimen of *Notodonta trepida*, which I took at electric light on Jun 6th.—O. Farrant; Taunton, Somerset.

Note on Larvæ of Nudaria mundana.—When in Gloucestershire on the Cotswolds, last summer, I found on one occasion a number of smal larvæ, pale brown in colour and somewhat hairy, congregated together o an old wooden rustic gate. On looking closely, I found they were feedin on a green lichen on the wood. Taking a few of them, I fed them on th green lichen on pieces of the bark of larch firs; they ultimately turned t small pale pupæ, in a slight web, and emerged as *Nudaria mundana*. have always found this moth common on the Cotswolds, but have no seen it in this district, neither in parts of South Wales; so apparently i is rather local. The above may be of interest to those entomologists who are not acquainted with the larvæ.—T. B. JEFFERYS; Clevedon.

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* I am aware that this may sound very like definitely adopting the views fo which Geddes and Thomson were somewhat severely criticised; but, as a matter c fact, I am rather throwing out a suggestion than proposing a definite hypothesis.

[Larvæ of *N. mundana* are common on the loose stone walls around Lynton, Lynmouth, and Ilfracombe, in N. Devon. Occasionally they are found on the rocks by the sea, but always above high-water mark, in the same localities.—ED.]

NEW SPECIES OF LEPIDOPTERA FROM QUEENSLAND.—In the 'Queenslander,' May 2nd and 9th, 1891, Dr. T. P. Lucas, of Brisbane, describes the following species of Lepidoptera as new to Science :—*Holochila* (*Polyommatus*) *translucens*, n. s.; *H.* (*P.*) *cæruleolactea*, n. s.; *Macroglossa approximans*, n. s. (allied to *M. errans*, Boisd.); *M. tenebrosa*, n. s. (allied to *M. micacea*, Walk.); *M. lineata*, n. s. (near *M. trochilus*, Hübn.; *M. sitieul*, Boisd., and *M. corythus*, Boisd.); *Chærocampa curvilinea*, n. s. (allied to *C. clotho*, Drury); *C. luteotincta*, n. s.; *C. queenslandi*, n. s.; *Panacra turneri*, n. s.; *Sphinx distincta*, n. s. (allied to *S. convolvuli* and *S. rosea*); *S. eramophilæ*, n. s.—ED.

AUSTRALIAN RHOPALOCERA: A CORRECTION IN.—*Lycæna exilis*, Queensland Royal. Col. Trans. 1889, should be *Lycæna exiloides*, Luc.—T. P. LUCAS: Brisbane, Queensland.

EMERGENCE OF IMAGO AFTER INJURY TO LARVA.—Last season I had a number of the larvæ of *Bombyx quercus* feeding in a glass receptacle, and through an accident one was badly cut by broken glass. Although little thinking that the larva would survive, I placed some fine earth upon the wound, and the bleeding was stopped. The larva had contracted considerably, but soon after formed a weak light-coloured cocoon, which subsequently developed (to my surprise) a perfect male specimen, much smaller and paler than the type. I may state that the larva was a large one, and from its size I should have expected a female imago. Until the present instance all larvæ badly injured that have come under my notice have succumbed.—ALFRED T. M. MITCHELL; 5, Clayton Terrace, Gunnersbury, June 15, 1891.

DRYMONIA CHAONIA AND CUCULLIA CHAMOMILLÆ AT CHRISTCHURCH.—It may be of interest to note that I captured, on May 9th, a female specimen of *Drymonia chaonia*, whilst flying at dusk in my garden, from which I obtained some ova; also *Cucullia chamomillæ*, on the evening of the 11th, at laurel blossom close to the same spot. Both are in fine condition, and I believe these species have never been taken in this neighbourhood before. —J. M. ADYE; Somerford Grange, June 3, 1891.

NOTE ON CIDARIA SUFFUMATA.—In May, 1890, Mr. Purdy, of Folkestone, sent me two or three female specimens of *C. suffumata*, which he had captured in the Dover locality celebrated for producing a very beautiful black-banded silvery form of the species. At the same time he forwarded me a few ova deposited by a female of the form referred to. The female specimens were in a moribund condition when they came to hand; however, each had laid a few eggs during their journey to town, but these, together with those from the aberrant female, did not exceed forty in number. It was not thought worth while to keep the small batches separate, so all were placed together in a box, and when the larvæ hatched out they were fed up as one brood. The larvæ were started in life upon a diet of the common cleavers (*Galium aparine*), but were subsequently supplied at intervals with *G. mollugo* and *G. saxatile*), both of which they ate with gusto. *G. aparine*, however, formed the principal article of their daily bill of fare. Pupation occurred in earthen cocoons formed in June. The bulk of the pupæ were kept indoors, but a portion of them were allowed to remain in the garden throughout the memorable winter of 1890-91. The first specimen, a male, emerged from the indoor pupæ on the 10th of April, and was followed by others each day during the month. The moths from the outdoor pupæ emerged from the 8th to the 12th of May. Examples of the black-banded silvery variety were obtained from each lot, nine specimens in all. I may add that at the present time (June 24th) I have pupæ from the following pairings;—

A. Typical ♀, bred April 12 × typical ♂, bred April 12.
B. Banded silvery ♀, „ „ 13 × „ ♂, „ „ 14.
C. Typical ♀, „ „ 17 × crippled typical ♂, „ „ 10.

—Richard South; 12 Abbey Gardens, London, N.W.

Habits of Leucophasia sinapis.—On the 31st of May I had the pleasure of seeing *L. sinapis*, the first I have seen this season. I saw only one specimen, and this during the short time I watched it settled on three flowers. I am not familiar with this insect, but had always understood that it is rarely seen to settle. I should be obliged if someone would give me information on this point.—H. S. Fremlin; 4, Angel Terrace, Tiverton, June 2, 1891.

Captures at the Electric Light.—In a recent number of the American 'Entomological News,' Mr. Rodrigues Ottolengui contributes an interesting account of work done at two electric lights in a secluded part of Brooklyn. Last season he and his sister visited the lights, and with nets and bottles captured a very large number of Lepidoptera during the seventy-five nights they devoted to the pastime. Among the captures were —Sphingidæ, 13 species; Zygænidæ, 3 species; Bombyces, 37 species; Noctuæ, 59 species; and Geometræ, 17 species. Some of the species obtained were considered rare in the district, and others appear to be additions to the insect fauna-list of Brooklyn. Mr. Ottolengui does not state at what height the lights were from the ground; but our lepidopterists living in towns where the electric light is situated in favourable spots, will perhaps do well to give such lights their careful attention.—Richard South.

Note on Coremia unidentaria.—On the 1st of August, 1890, I captured a female *C. unidentaria*, which deposited a small batch of ova. The larvæ were kept indoors, fed throughout on knotgrass (*Polygonum aviculare*), and, with the exception of four individuals, all had assumed the pupa state in October. The first imago, a male, made its appearance on the evening of December 31st; two others came up on the 4th of February, and were succeeded by one male and two females on March 1st, and two females on March 7th. Between the last date and the 25th of the month several specimens of each sex emerged. Two females were placed in boxes, and deposited ova—on pieces of thread with which they were supplied for the purpose—between the 18th and 20th of March; larvæ from these hatched out from April 8th to 11th, and were supplied with dock at first, but dandelion was afterwards added, and later on primrose and hawthorn. All these plants were favourably received, and, although when it was first added to the *menu* a decided preference was shown for the primrose, this did not last long, and on the whole the larvæ seemed to be equally content with *Rumex* or *Taraxacum*, *Primula* or *Cratægus*. The larvæ commenced to go down on May 29th. As has been stated, four caterpillars hybernated; these were supplied with dock and dandelion in March, attained the pupa state at the end of that month, and produced three female imagines between 27th and 29th of April. There is no difference whatever between these specimens and those obtained from the larvæ which pupated in October. On the 23rd of May a female was captured at Oxshott, and deposited about thirty-six eggs between that date and the 28th, when she died; the larvæ hatched out June 4th, and are being fed on hawthorn and bramble.—Richard South; June 20, 1891.

Stauropus fagi in Oxfordshire.—I doubt not 1891 will be remembered by Reading collectors as a great *fagi* year; they have appeared in unusual numbers. My own share has been eleven—six males and five females. I started with two males on the 20th May, and finished up with a female on the 4th June; my best take was three females on June 2nd. The males were out fully a week before the females. A tree to tree search must be made to find *fagi*, the smaller trees being the most favoured. Ten moths of the eleven I found on the N. or N.E. side of the trunk; the eleventh was a cripple, which had chosen the S. side. There is every probability of *fagi* occurring in all the big beech woods that abound on the borders of the Thames Valley, finding it being merely a matter of thorough and systematic searching.—J. Clarke; Reading, June, 1891.

Tortrix piceana, &c., in the Esher District.—Larvæ of *Tortrix piceana* appear to be scarce this year in the pine woods around Esher. On Saturday, June 13th last, the united efforts of four keen hunters resulted in a grand total of four larvæ and one pupa. This was rather a poor afternoon's work. However, the time was not altogether spent in vain, as larvæ of sundry other fir-feeding Tortrices were obtained pretty freely; among the insects to be bred from these is probably *Sericoris bifasciana*. In the evening, high-flying Tortrices were fairly common, and several fine specimens of *Pædisca rubiginosana*, *Retinia pinivorana*, and *R. turionella* were captured; whilst a splendid female *Bombyx rubi* fell to the net of a member of the quartette, who also captured one female specimen of *Scodonia belgiaria*.—R. Adkin; Lewisham, June, 1891.

Xanthia citrago Larvæ at Rotherham.—The larvæ of *X. citrago* have been rather plentiful in our district this year. Spring larvæ have been fairly numerous; and altogether I have, so far, had a good entomological season.—J. N. Young; Rotherham, June 13, 1891.

Decoy for Butterflies.—I understand that some collectors of tropical butterflies find it a good plan to use a decoy to facilitate the capture of the shy species of Nymphalidæ. When a specimen of a desired species is secured, this is killed and placed with its wings expanded, either on the ground or on a twig, within easy striking distance of the operator, who takes up a convenient position, where he must be, as far as possible, concealed, and there await the arrival of other specimens. Perhaps the would-be captor of *Apatura iris* may think it worth while to try a decoy in some haunt of H. I. M. Probably a dry set-out specimen would answer the purpose.—Richard South.

Bananas, a Bait for Lepidoptera.—Over-ripe or decaying bananas have been successfully used as a bait for night-flying moths, as well as butterflies. The fruit should be cut in slices and pinned on trees, or otherwise exposed, as may be most convenient.—Richard South.

Andrena bucephala at Box Hill. — This being an entirely new locality for this species of spring bee, I have very great pleasure in recording so interesting a capture. On the 5th of last month, in the company of Mr. A. Beaumont, I visited the neighbourhod of Box Hill, hoping to captnre a few additional insects for my collection. The weather was overcast, with a cold N.E. wind blowing, and anything but propitious for our recreation. We were, however, favoured with an occasional spell of sunshine, which, although very brief, while it lasted induced a host of insects to appear. During one of these intervals of sunshine we came across a magnificent clump of sloe bushes (*Prunus spinosa*), which were completely covered with a dense mass of bloom; hovering over and around these bushes were numerous species of Diptera, Ichneumonidæ, Andrenadæ, &c., and, amongst others, *Andrena bucephala*, Steph., several of which were captured, Mr. Beaumont taking one with an abnormally large head. As I was not familiar with this species, I submitted it to my friend Mr. Edward Saunders, who, with his usual kindness, at once identified it for me, and at the same time informed me that it was an extremely interesting capture. Mr. Smith, in his Cat. Brit. Hym., 2 ed., p. 41, says "the species is now rare," and gives as localities for it Bristol and Chobham Common. Mr. E. Saunders says local, and adds Hampstead as another locality, *Andrena albicans*, *A. trimmerana*, and *A. nigroænea* were very abundant, while *Nomada ruficornis* and *N. alternata*, although not so numerous, were also in the company.—T. R. Billups; 20, Swiss Villas Coplestone Road, Peckham, S.E.

Nomada lateralis, *Panz.*, at Box Hill.—Two specimens of this handsome parasitic bee were also taken by me at the same cluster of bushes, and, as Mr. Edward Saunders only gives Norwich, Yorkshire and Newcastle as its known localities, while Mr. Smith adds Highgate Archway, I think it is nearly safe to assume that this is also a new locality for the species. As it was captured in company of *Andrena bucephala*, which is said to be its host, I have much pleasure in being able to record the capture of parasite and host at the same time.—T. R. Billups.

SOCIETIES.

Entomological Society of London.—*May 6th*, 1891.—Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. Mr. J. M. Ayde, of Somerford Grange, Christchurch, Hants, and the Rev. John Seymour St. John, B.A., of 42, Castlewood Road, Stamford Hill, N., were elected Fellows; and Mr. R. A. Dallas Beeching was admitted into the Society. Mr. E. B. Poulton exhibited living larvæ of *Endromis versicolora*, and commented on their habits. Mr. W. F. H. Blandford called attention to the fact that the larvæ of *Liparis monacha* remained in small groups on the bark of the tree for about a week after emerging from the eggs, and that this fact was taken advantage of by the German foresters to destroy them. Also that he had himself verified the statement that uric acid can be detected in the malpighian tubes of insects. Mr. M'Lachlan agreed that the demonstration that the malpighian tubes were of the nature of renal organs was now satisfactory. Mr. C. J. Gahan exhibited two species of Coleoptera that he considered to possess a mimetic resemblance, viz., *Estigmena chinensis*, one of the Hispidæ, and a nondescript Lamiid allied to *Pemptolasius*. He called attention to a peculiar structure of the antennæ in the latter by which the resemblance was increased. Mr. J. W. Tutt exhibited a hybrid between *Amphidasis prodromaria* and *A. betularia*, obtained by Dr. Chapman. Mr. Stainton commented on the fact that the two insects appeared at different times; and Mr. Tutt stated that the *A. betularia* had been subjected to forcing, so as to cause it to emerge at the same time as *A. prodromaria*. Mr. Tutt also exhibited forms of *Caradrina*, some of which he said were considered distinct on the Continent, though they were not recognised as such in this country, viz., *C. taraxaci* (*blanda*) *C. superstes*, Tr., from Sligo, and *C. superstes*, H.-S., considered as synonymous with *superstes*, Tr., but apparently more closely allied to *C. ambigua*. Mr. B. A. Bristowe exhibited varieties of *Arctia menthastri*, some of which had been fed on mulberry and others on walnut; no difference was observed in the variation. Mr. G. Elisha exhibited larvæ in their cases of *Coleophora vibicigerella* and *C. maritimella*. Mr. A. G. Butler communicated a paper entitled "Additional notes on the synonymy of the genera of Noctuid Moths."—David Sharp, V.P., *Acting Secretary*.

South London Entomological and Natural History Society.—*May* 28*th*, 1891.—Mr. C. G. Barrett, F.E.S., Vice-President, in the chair. Mr. J. F. Farmer, of Surbiton, was elected a member. Mr. C. Fenn exhibited a series of *Biston hirtaria*, Clerck, and stated that he had taken 70 in three-quarters of an hour in Finsbury Circus. Mr. R. Adkin, *Endromis versicolor*, L., bred from larvæ fed in 1888; and remarked that, in 1889, two females emerged; in 1890, five females and one male. Mr. Dobson, referring to a brood of *Acronycta leporina*, L., said that the first year about 15 per cent. came out, in the second year 60 per cent. Mr. Fenn stated that the late Mr. Tester had told him that *E. versicolor* sometimes remained in pupa over five years. References were also made to other species laying over, among which were *Eriogaster lanestris*, L., *Asteroscopus nubeculosa*, Esp., *Eupithecia venosata*, Fb., *Emmelesia albulata*, Schiff., and *E. unifasciata*. Mr. South exhibited specimens of *Vanessa antiopa*, L., from India, China, Japan, Germany, and France, and remarked that the American form was usually considered to present a more powdery appearance of the border, but some of the specimens shown from France were quite as much powdered. Mr. Cockerell exhibited a variety of *V. antiopa*, having the margins irrorated with black, from Colorado. A discussion ensued with regard to the colour of the margins of this species in different countries, and whether the colour of living insects could fade. Mr. South also exhibited *Cidaria suffumata*, Hb., bred from parents received from Dover, and he made some observations thereon. Mr. Tutt, a hybrid between *Amphidasys betularia*, L., and *A. strataria*, Hufn., belonging to Dr. Chapman, and types for comparison; also *Caradrina ambigua*, Fb., from Deal; also typical specimens of *C. taraxaci*, Hb., and *C. superstes*, Tr., from Sligo; and *C. superstes*, H.-S., from Yarmouth, Isle of Wight. Mr. Adye, a dark form of *Cucullia chamomillæ*, Schiff. Mr. Hawes, a sketch of *Euchloë cardamines*, L., at rest on a piece of grass, and pointed out that its position was well adapted for keeping off the rain. Mr. Cockerell, *Clausilia rolphii*, from Plumstead, collected by the Rev. J. W. Horsley.

June 11th, 1891.—Mr. W. H. Tugwell, President, in the chair. Mr. R. Adkin exhibited and made remarks on *Larentia didymata*, Tr., from the Isle of Man. Mr. Tugwell, *Spilosoma mendica*, Esp., bred from ova received from Mr. Porritt: and specimens, sent from Mr. Harrison, as being the normal form in the Barnsley district. Mr. Tugwell pointed out that the males of the species from Barnsley were paler and smaller than the usual southern form, and gradually toned down toward the var. *rustica*. Mr. Tutt, specimens of *Vanessa atalanta*, L. (of which five were bred), with the right superior wing very small, but perfectly developed. Mr. Hall stated that he had a quantity of *Sesia myopiformis*, Bork., feeding in some pear trees in his garden, and wished to know the best means of taking them, and it was suggested sleeving the infected branches; and it was remarked that the species emerged early in the morning. Several observations were made on the backwardness of the season and the absence of Lepidoptera, although Mr. Auld stated that he had found many species abundant in Kent; and Mr. Adye said he had seen *Heliaca tenebrata*, Scop., and several other species, extremely abundant in a meadow near Willesden.

On the 23rd May last, the members of the South London Entomological and Natural History Society had an excursion to Oxshot, Surrey, which was conducted by Mr. R. South. There were nearly twenty members who availed themselves of this opportunity of visiting the locality. The weather was fine, but the wind extremely cold, and this, coupled with the lateness of the season, resulted in the individual captures being somewhat small. On leaving the station several specimens of *Euchelia jacobææ*, L., were taken; and shortly afterwards ova of *Gonopteryx rhamni*, L., were found, *in situ*, on a solitary bush of buckthorn. Larvæ of *Cymatophora flavicornis*, L., were taken by Mr. T. J. Washford, who obtained seven or eight; while several other members obtained them, but in less numbers. On the heath, beside the line, a very pretty form of *Ematurga atomaria*, L., occurred, and a black specimen was taken; Mr. Fruing Warne also obtained a black specimen of this species, and also a pretty variety of *Tephrosia crepuscularia*, Hb., the ground colour being yellow. Among other species occurring sparingly were *Cabera pusaria*, L., *Melanippe sociata*, Bork., *Anticlea badiata*, Hb., *Coremia ferrugata*, Clerck, *C. unidentaria*, larvæ of *Ellopia prosapiaria*, L., *Thera variata*, Schiff., and were obtained, but were not plentiful. Mr. Step obtained a good many species of mosses; and took a nest of the willow-warbler, containing seven eggs; and many of the party obtained some good and local plants. Particulars of the future excursions can be obtained of H. W. Barker, 83, Brayards Road, Peckham. — H. W. Barker, *Hon. Sec.*

Birmingham Entomological Society.—*June 1st*, 1891.—Mr. R. C. Bradley in the chair. Mr. G. W. Wynn showed eggs of *Endromis versicolor*, found on birch twigs at Wyre Forest; two small batches had been found placed round the stem, near to the ends of the twigs. He also showed *Tæniocampa populi* from Marston Green, &c. Mr. A. Johnson showed larvæ of *Hibernia aurantiaria*, bred from specimens taken at Sutton. Mr. R. C. Bradley showed a box of Pyralidæ from his collection.—Colbran J. Wainwright, *Hon. Sec.*

THE ENTOMOLOGIST.

Vol. XXIV.] AUGUST, 1891. [No. 339.

ORNITHOPTERA TROJANA, Staudinger.

Plate IV.

In the 'Iris,' vol. ii. p. 4, will be found a very fully detailed description of this lovely butterfly. The specimen from which the accompanying plate has been drawn was recently received by me. It came from Palawan (an island to the north of, and about a hundred miles from, Borneo), and it will be seen that it does not differ in any material degree from those received and so excellently described by Dr. Staudinger. This eminent lepidopterist has, however, so far as I can learn, not yet figured the species, and the accompanying Plate will illustrate it for the first time.

"Of this grand new species, or local form of *brookiana*, Dr. Platen unfortunately sent only five males, which were found to differ very little. They are of the same size as the largest *brookiana*, of which the anterior wing of the largest male out of hundreds of specimens measured 3 in. 3 lin., whereas that of the largest *trojana* measured fully 3 in. 7 lin. The green markings of the *trojana* are not of so striking and brilliant gold-green as those found always on the *brookiana*, but more of a blue-green; by one light they are quite a green-blue, whereas by another more emerald than gold-green. The *trojana* has also on the hind margin seven green patches, although they are shorter, wider apart, and not so pointed on their outer end. These patches (of which the last one is always quite separate from the others) gives, on account of this, quite another impression to the *brookiana*, where they appear to run more parallel with the costa, being nothing like so far apart, whereas these diverge on the *trojana*, and only run parallel with the hind margin. Although the different patches (with the exception of the under one, which is quite as pointed as those on the *brookiana*) are much blunter towards the outer end; they come nearer the fringes of the hind margin than on the *brookiana*, almost touching it. In particular the more pointed lower green patches of *brookiana* generally end noticeably farther from the hind margin. On the smaller patches of the *trojana* there is missing, not only the point, but also a piece from the basal end, and they are placed nearer the hind margin. The first three to four upper patches in particular are as far apart as they are wide, the lower ones not quite so much, but all of them are always more separated than on the *brookiana*. The conspicuous blue basal spot on the costa of *brookiana* is not found on *trojana*. On the under side, besides the decided blue stripes underneath the middle and on the basal part of the costa, are three pairs of small blue-green (green-blue) stripes between the medial nervures.

"There is more difference between the posterior than between the anterior wings of the *trojana* and *brookiana*. The former has only one blue-green transverse band behind the middle (middle cell). This band, which is not very wide, is divided by the nervures into five or six more or less irregular crescent-shaped (or zigzag) patches on the inside, but which are still connected on the before-mentioned specimens. The whole inner half on the *trojana* is black, and only the nervures more or less faintly marked deep blue, whereas on the *brookiana* it is, with the exception of the costa and a small part of the base, gold-green. The fold in particular, which is turned over, is quite black on the inside although on one specimen it is touched with deep blue on the edges; the blue-green transverse band is nearer the hind margin on the *trojana* than the edge of the gold-green base division on the *brookiana*. The under side at the base has exactly similar deep blue basal spots as the *brookiana*, but towards the outer part only five to seven small white-grey spots near the nervures. The collar band (prothorax with back of head), as well as the breast, are of a lighter red than on *brookiana*.

"*Ornithoptera trojana* is no doubt rarer, and differs more from *brookiana* than a great many other Ornithopteras that have similarity, and can therefore well be termed a distinct species. The fact also, that amongst at least 1000 *Ornithoptera brookiana* from Borneo, Perak, and Sumatra, there was not one specimen found approaching in appearance, nor in a transitory state, to *trojana*, speaks well for the presumption that it is a totally different species.

"But, in view of the wonderful arrangement of design, only met with in these two species (which in itself alone gives rise to generic separation from the *Ornithoptera*), it is just possible that the *trojana*, owing to circumstances (climatic, geological, &c.) unknown to us, is a form of *brookiana* peculiar to the Island of Palawan" (Staudinger).

The specimen figured is almost in bred condition, and is in the rich collection of Mr. Herbert J. Adams, of Enfield. It has the edge of the fold marked with deep rich blue, as in the specimens referred to by Dr. Staudinger.

WILLIAM WATKINS.

The Hollies, Croydon, July, 1891.

NOTES ON RHOPALOCERA IN CORFU.

By FRANK B. NORRIS.

WHILST lately visiting Corfu with a friend intent on Botany, I carried my net with me, and, thinking that a list of butterflies taken there during the latter half of May and first half of June might interest some of your readers, I venture to send it to you:—

Papilio podalirius, L. (*sinon*, Poda.) Common on tops of mountains. *P. machaon*, L. Common on tops of mountains. *P. alexanor*, E. Much less common and apparently earlier.

Pieris brassicæ, L. Fairly common. *P. rapæ*, L. Fairly common. *P. ergane*, Hb. Rare. *P. daplidice*, L. Common in lowlands.

Euchloë belia, F., and var. *ansonia*, Hb. Common. *E. tagis*, Hb. Common on hills. Var. *bellezina*. Common on hills.

Leucophasia sinapis, L, Large, 1·75 in. and above. Ab. *diniensis*, Bdv. Common.

Colias edusa, F. Approaching *C. myrmidone*, E., in colour and markings; abundant. Some specimens of male insect had hind wings shot with rosy violet.

Gonoptergx rhamni, L. *G. cleopatra*, L. Commoner than the above.

Thecla ilicis, E. Abundant on low bushes on hill slopes. *T. rubi*, L. On hills in May.

Polyommatus alciphron, Rott. Rare; May. *P. phlæas* var *eleus*, F. Common.

Lycæna argiolus, L. In the Park. *L. minimus*, Fuessly. Mte. San Salvatore; May. *L. melanops*, Bdv. On bushy slopes; May.

Charaxes jasius, L. This splendid butterfly first appeared towards end of May, and became more abundant as June progressed. Always found on higher mountain tops, where the arbutus grows freely, such as on Mte. Mattia, San Georgio, &c. Its exceedingly rapid flight makes its capture difficult without breaking off the tails.

Limenitis camilla, F. On bushy sheltered slopes.

Vanessa egea, Cr. Common. *V. polychloros*, L. Over trees in town of Corfu and Park. *V. urticæ*, L. Rare; of the variety *turcica*, Stgr. *V. io*, L. Not common. *V. antiopa*, L. Not common. *V. atalanta*, L. Common. *V. cardui*, L. Common.

Melitæa didyma, O. Very common. *M. cinxia*, L. Not common; May. *M. phœbe*, Kn. Hill-tops; May.

Melanargia larissa, Hb. Abundant; June.

Satyrus hermione, L. Common on mountains, settling on rocks and trees. *S. semele*, L. Females very large, measuring nearly 3 in.

Pararge roxelana, Cr. Common on hill-sides, settling on olive trunks and rocks with *S. hermione*. *P. mæra*, L. Scarce; May. *P. megæra*, L. Scarce; May. *P. egeria*, L. In Park.

Epinephele janira, and var. *hispulla*, Hb. Common. *E. ida*, E. On coast and towards Lefkimo; June.

Spilothyrus alceæ, E. Not common; May.

Syrichthus orbifer, Hb. Fairly common; May.

Nisoniades marloyi, Bdv. Rare; Mte. Pylides. May.

Hesperia thaumas, E. Fairly common, but local. *H. actæon*, E. Fairly common, but local. *H. sylvanus*, E. Fairly common, but local.

Also one or two other skippers I have not quite determined.

The above list is, I know, a short one, and whole genera are absent; but no doubt I missed many of the spring insects, and left previous to the emergence of the autumn species. It was noticeable that the summits of the mountains and hills afforded the best sport. I need hardly speak of the extreme beauty of the island, so rich in plants, or of the olive trees, which are said to be the finest in the world, or of the picturesque Greek costumes of the inhabitants. The climate was superb; no rain fell during the month I was there, and, although the sun's heat in June was very fierce, there was always a pleasant sea-breeze.

Bagni di Lucca.

SYNONYMIC NOTES: PYRALIDÆ.

By W. Warren, M.A., F.E.S., &c.

Through the comparison of types and descriptions rendered necessary in the course of rearranging the Pyralidæ in the British Museum Collection, many synonymic rectifications have occurred; and as the publication of the synonymy *in full* will not be practicable at present, a selection is now given of a few of the most important, and generally interesting, corrections.

Herbula, *Guenée*.

Herbula torvalis.

Botys torvalis, Moeschl., W. E. M., 1864, p. 198, pl. 5, fig. 16, ♂; Pack. Labr., xi., 52; S. & W., Cat., No. 191.

Scoparia gelida, M'Lachl., Journ. Linn. Soc., xiv., p. 115.

A comparison of the specimens from Grinnell's Land, in the Brit. Mus. Coll., named by Mr. M'Lachlan *Scoparia gelida*, with examples of *Botys torvalis*, Moeschl., lately received from Dr. Staudinger, establishes the identity of the two species. Moeschler's name has the priority.

EUMELIA, *Hübner.*

Eumelia venustalis.

Phalæna venustalis, Cram., Pap. Exot., iv., pl. 371, fig. 1.
Eumelia testula, Hüb., Zutr., v., 8, 409, figs. 817, 818.
Botys divulsalis, Zell., Caffr., p. 47.
Eurycreon divulsalis, Led., W. E. M., vii., p. 376.
Scopula jucundalis, Wlk., xxxiv., p. 1469.
South Africa.

Zeller considered his *divulsalis* to be different from *testula* and *venustalis;* but the points of difference appear to be due to sex and variation only.

BLEPHARUCHA, *Warr.*

Blepharucha zaide.

Phalæna Pyralis zaide, Stoll., pl. 36, fig. 6.
Botys zaide, Led., W. E. M., vii., pp. 368, 461, pl. 8, fig. 8.
Cynæda (?) *zaide*, Wlk., xxxiv., p. 1224.
Dichroma zaida, Wlk., xxiv., p. 1146.
Argyrophora zaidaria, Guen., Phal., ii., p. 232.
Botys cruoralis, Zell., Caffr., p. 51.
Scopula dilaceratalis, Wlk., xxxiv., p. 1469.
South Africa.

Blepharucha plumbatalis.

Botys plumbatalis, Zell., Caffr., p. 47. *B. plumbofascialis*, Led., W. E. M., vii., pp. 363, 461, pl. 8, fig. 7.
Boreophila plumbofascialis, Wlk., xxxiv., p. 1280.
Scopula ferriscriptalis, Wlk., xxxiv., p. 1467.
South Africa.

BOREOPHILA, *Guen.*

Boreophila commixtalis.

Scopula commixtalis, Wlk., xxxiv., p. 1459.
Crambus indotatellus, Wlk., xxxv., p. 1752.
Botys septentrionalis, Tgstr., Cat., p. 358. *B. manualis*, var. *b*, S. & W., Cat., No. 136.

The types of *commixtalis* and *indotatellus*, both from Canada; of *septentrionalis*, from Finland. In his Catalogue, *loc. cit.*, Staudinger, after quoting *septentrionalis*, Tgstr., as a var. of *manualis*, adds the query, "species propria?" The comparison of Walker's type of *commixtalis* with specimens in the Zeller Collection, marked *septentrionalis*, Tengstr., shows their identity. This occurrence of the same species in Finland and N. Canada is interesting. Walker's type of *indotatellus*—recognizable, but in deplorable condition—is from the same locality and source as his type of *commixtalis*.

Boreophila frustalis.

Botys frustalis, Zell., Caffr., p. 48.

Eurycreon frustalis, Led., W. E. M., vii., p. 376. *E. leucostictalis*, Zell., Verh., Z. B., Ver., 1872, p. 518.

After describing *B. cereralis* (*Eurycreon*) from North America, Zeller, *loc. cit.*, adds the description of another species of the same genus from South Africa, under the name of *leucostictalis*, evidently, as it would seem, forgetting that he had already introduced the species under the name of *frustalis*.

Guenée, when he formed the genus *Boreophila* (Delt. & Pyr., p. 155), drew attention to the fact that it differed from the species of *Hercyna* by the absence of the dense and furry scaling that characterizes that genus. His first species, *manualis*, agrees well with this exception; but the other two, *scandinavialis* and *frigidalis*, do *not*. He himself, even, admits that these last are more densely scaled than is *manualis*, and form a kind of transition to *Hercyna*. As a matter of fact, his typical *Boreophila*—*manualis*—is congeneric with that group of *Spilodes*, Guen., of which *sticticalis* is the representative, in which the projection of the forehead is far less conspicuous than in *Spilodes* proper; and with the other species, which Lederer lumps together under the head of *Eurycreon*, including, besides *sticticalis*, Linn., the following species:—*cerealis*, Zell., *commixtalis*, Walk., *officinalis*, Hulst., all from North America; and *frustalis*, Zell., from South Africa.

SPILODES, *Guen.*

Spilodes helvialis, Walk., xviii., p. 772.

Botys thycesalis, Wlk., xix., p. 981. *B. apertalis*, Wlk., xxxiv., p. 1393 (*nec* p. 1451).

Botis citrina, Gr. & R., Tr. Am. Ent. Soc., i. p. 23, pl. 2, fig. 2; Zell., Verh. Z. B. Ver., 1872, p. 507.

Spilodes obliteralis.

Botys obliteralis, Wlk., xxxiv., p. 1392.

Botis marculenta, Gr. & R., Tr. Am. Ent. Soc., i., p. 23, pl. 2, fig. 21 (*nec* Zeller).

Spilodes mancalis.

Botys mancalis, Led., W. E. M., vii., pp. 371, 464, pl. 9, fig. 4.

Botis marculenta, Zell., Verh. Z. B. Ver., 1872, p. 507 (*nec* Gr. & R.).

In the Verh. Z. B. Ver., *loc. cit.*, Zeller states that "he thought he had Gr. & R.'s *marculenta* before him, though his specimens did not tally, *in all particulars*, with their description." Zeller's own description, however, evidently refers to *B. mancalis*, Led. Subsequently to Zeller's article, Grote seems to have sent Zeller a pair of the real *marculenta*, Gr. & R. These have a label, in Zeller's own writing, "*B. marculenta*, Grote, N. Y., 73." The inverted commas to the name imply that this was Grote's naming, but that he, Zeller, did not quite endorse it; and this was natural; for these he had, the year before, called *marculenta* were different. Grote himself, however, it would appear, must have got into a muddle about the two species; perhaps owing to Zeller's mistake. Anyhow, in his own collection, the two species were mixed up. Three of the real *marculenta*, of Gr. & R., like the pair Grote had previously sent to Zeller, appear without any name; while of nine specimens of Zeller's wrongly-named *marculenta*, two are actually ticketed, by Grote himself, as "*marculenta*, Gr. & R." In any case, the name *marculenta* will lapse; Gr. & R.'s being superseded by *obliteralis*, Wlk., and Zeller's by *mancalis*, Led.

OPSIBOTYS, *Warr.*

Opsibotys incoloralis.

Botys incoloralis, Guen., Delt. & Pyr., p. 333; Led., W. E. M., vii., p. 371; Snell., Tijd. v. Ent., 1883, p. 126; Meyr., Tr. E. S., 1884, p. 322. *B. melonalis*, Wlk., xviii., p. 702.
Spilodes nitetisalis, Wlk., xviii., p. 773.
Botys albidalis, Wlk., xxxiv., p. 1411. *B. ruficostalis*, Led., Verh. Z. B. Ver., 1855, p. 217, pl. 3, fig. 4. *B. œdipodalis* (?), Swinh., Pr. Z. S., 1884, p. 325 (*nec* Guen.).

The types of *incoloralis*, Guen., *albidalis*, Wlk., and *œdipodalis*, Swinh., from Hindostan; of Lederer's *ruficostalis*, from Syria; of the other two, *nitetisalis* came from the Congo, and *melonalis* from Java; Snellen records it from Celebes, and Meyrick from Australia;—so that the range of the species is extensive; but Walker's *dasconalis*, from North America, is not, as Mr. Meyrick thinks, identical.

Opsibotys coclesalis.

Botys coclesalis, Wlk., xviii., p. 701. *B. itemalisalis*, Wlk., xix., p. 996. *B. strenualis*, Wlk., xxxiv., p. 1409. *B. interfusalis*, Wlk., xxxiv., p. 1443.

The types came from Borneo, China, India, and Java, respectively.

Opsibotys terrealis.

Botys terrealis, Tr., Schm. Eur., vii., p. 110; S. & W., Cat., No. 174. *B. mysippusalis*, Wlk., xviii., p. 564. *B. humilalis*, Led., W. E. M., pp. 371, 464, pl. 9, fig. 2.

The last two, both from North America.

Opsibotys extricalis.

Botys extricalis, Guen., Delt. & Pyr., p. 338; Wlk. xviii., p. 562.

Pionea dionalis, Wlk., xviii., p. 758.
Spilodes (?) *nisæecalis*, Wlk., xviii., p. 771.
Botys intricatalis, Led., W. E. M., vii., pp. 373, 469, pl. 10, fig. 9.
Botis oppilalis, Gr., Can. Ent., xii., p. 36.

The identification of Lederer's species with Guenée's is due to Prof. Fernald.

ISOCENTRIS, *Meyrick*.

Isocentris filalis.

Asopia filalis, Guen., Delt. & Pyr., p. 204.
Lygropia filalis, Led., W. E. M., vii., p. 381.
Botys filalis, Snell., Tijd. v. Ent., 1883, p. 131, pl. 7, fig. 11.
Endotricha rhodophilalis, Wlk., xxxiv., p. 1311.
Samea rhodophilalis, Moore, Ceyl., iii., p. 275, pl. 178, fig. 13, ♀.
Isocentris rhodophilalis, Meyr., Tr. E. S., 1887, p. 232.
Botys amœnalis, Wlk., xxxiv., p. 1445.
Samea dives, Butler, Pr. Z. S., 1880, p. 682.
Botys auralis, Snell., Tijd. v. Ent., 1872, p. 90, pl. 7, figs. 9, 10.

Another wide-ranging species. Guenée's type of *filalis* was from Mauritius; Snellen records it from Celebes, and also from Java, whence, too, Walker's *amœnalis;* Butler's *dives* is from Formosa; it occurs in India and Ceylon; and Meyrick gives it from Australia.

Isocentris xanthialis.

Botys xanthialis, Guen., D. & P., p. 343. *B. superbalis*, Wlk., xxxiv., p. 1397. *B. nicalis*, Snell., Tijd. v. Ent., xviii., p. 202, pl. 11, fig. 13.

All from Tropical America.

CONDYLORRHIZA, *Lederer*.

Condylorrhiza vestigialis.

Botyodes vestigialis, Guen., Delt. & Pyr., p. 321, ♂.
Botys illutalis, Guen., Delt. & Pyr., p. 333, ♀. ?
Condylorrhiza illutalis, Led., W. E. M., vii., p. 393, pl. 13, fig. 7, ♂.
Botys tritealis, Wlk., xviii., p. 597, ♀. *B. mestoralis*, Wlk., xviii., p. 729, ♀.

The type of Guenée's *illutalis*, a female, was from Brazil; of his *vestigialis*, a male, from Columbia. Walker's type of *tritealis*, from the west coast of South America; the locality of his *mestoralis* was unknown. That Guenée's *Botyodes vestigialis* is the same insect as his, subsequently described, *Botys illutalis*, will be evident on a careful comparison of his two descriptions with that of Lederer. Guenée gives the labial palpi of *vestigialis* as porrect; the wings, as semitransparent; the hind wing, with a fine subterminal line, quite close to the margin and parallel to it; the second stigma (the reniform) traversed by a pale *nervure* (in *illutalis* he says it is traversed by a "trait clair"); the abdomen of male, which sex, alone, he then described, is said to have the anal tuft black, mixed with yellow hairs, and so, Lederer, describing *illutalis*, a male, draws attention to this black anal tuft.

EPICORSIA, *Hübner*.

Epicorsia mellinalis.

Epicorsia mellinalis, Hüb., Zut., i., 24, 69, figs. 137, 138; Hüb., Verz., p. 356.
Lonchodes mellinalis, Guen., Delt. & Pyr., p. 355.
Botys mellinalis, Led., W. E. M., vii., p. 371. *B. œdipodalis*, Guen., Delt. & Pyr., p. 336; Led., W. E. M., vii., p. 371. *B. butyrosa*, Butler, Pr. Z. S., 1878, p. 493.

Hübner's type of *E. mellinalis* was from Brazil; a comparison of his figure with the description of *œdipodalis* will at once suggest their identity. Guenée, judging from Hübner's figure only, referred the species to his genus *Lonchodes*, of which the labial palpi are upright and applied to the forehead; and, therefore, when he described *œdipodalis*, would naturally not think of identifying it, with its porrect labial palpi, with *mellinalis*, which he had supposed to be a *Lonchodes*. Lederer evidently thought the two species closely related, as he places *œdipodalis*—with which, under that name, he was unacquainted—immediately after *mellinalis*, which he had identified.

EBULEA, *Guen.*

Ebulea fumalis.

Ebulea fumalis, Guen., Delt. & Pyr., p. 358.
Scopula orasusalis, Wlk., xix., p. 784.
Botis badipennis, Grote, Bull. Buff. Soc. N. H., i., p. 88, pl. 2, fig. 12.

All the types from North America.

CROCIDOLOMIA, *Zell.*

Crocidolomia binotalis.

Crocidolomia binotalis, Zell., Caffr., p. 66.
Pionea comalis, Guen., Delt. & Pyr., p. 368, ♂. *P. incomalis*, Guen., Delt. & Pyr., p. 369, ♀.

As Zeller's *binotalis* was described from Caffraria, its identity with the Indian insect, the two sexes of which were referred by Guenée to distinct species, was not suspected. Now that the species is known to range from Africa to Australia, this identity admits of no dispute.

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. Perry Coste, F.C.S., F.L.S.

(Continued from p. 170.)

VI.—The Biological Aspect (*continued*).

In the next place, it has appeared to me very strongly suggestive that so many varieties are obtained by *breeding:* with certain red species, I believe, that by breeding on the large scale a percentage of yellow varieties may be certainly expected:[*] now, it is certain that in breeding insects the natural conditions of life are never attained, and it is therefore not at all strange that a certain derangement of the constitution should occur, leading to imperfect colour development, *i. e.*, to retrogressive varieties.[†] Very strongly confirmatory, I think, of this view is a fact that I found recorded in the 'Entomologist' (xxiii. p. 134), by Mr. Johnson, who states that a large brood of *A. caia*, reared by him, produced a large percentage of yellowish, &c., varieties, and *also very many cripples.*[‡]

It must be noted further that, by this principle of *indirect* action, through affecting the constitution, &c., we may equally explain such varieties as the albino specimens of *L. phlæas* and the various heath butterflies: it would be exceedingly interesting and instructive if someone who has the opportunity would breed such species on a large scale, keeping them short of food, or otherwise exposing them to somewhat unhealthy conditions; in such case one ought to find—if the above view be correct—a large number of albino varieties. And lastly, I may note a circumstance cited by Wallace—that there is an abnormally large percentage of *pale* or *white* varieties on islands, especially on small ones. It must seem certainly well-nigh impossible to correlate this with any chemical peculiarities of the soil,[§] but it is easy to undertand that the general conditions may so affect the constitution as to arrest the development of pigment.[||] Taking all these facts into consideration, therefore, it does appear to me that there are at least very strong grounds for hesitating to invoke any so direct a factor as the chemical peculiarities of soil or food in order to account for coloric variations; and that there is at least some reason to ascribe the variations to general indirect influences of the surrounding conditions, which may unfavourably affect the constitution and metabolic processes of the insects. It must be remembered that—as I pointed out some time since—all such products as pigments are almost certainly produced by the decomposition of the protoplasm; the various food constituents are first built up into protoplasm, and then this decomposes, with the result of producing *inter alia* pigments.* We cannot safely assume any direct synthesis of such pigments direct from the food, and it does therefore appear to me a somewhat crude, and, so to say, almost too simply *mechanical* a suggestion, that the presence of some unusual chemical constituent† in the food may directly cause a different pigment to be produced. However, there is certainly a wide field for experiment in this direction open to any one who can obtain abundant material for breeding.

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[*] *Cf.*, however, a statement in Entom. xxii. p. 259.

[†] Of course, it is necessary to the validity of this argument that a larger percentage of such varieties should occur among bred specimens than among those in the natural state. It would be interesting to know whether or not such is the case.

[‡] *Cf.* also Mr. Mitchell's note in Entom. p. 171. Mr. Johnson does not state whether any of the yellowish varieties were also cripples or not.

[§] If it be assumed that the presence of salt in the food has anything to do with this, we ought to find similar varieties on all shore lines.

[||] If, indeed, the whole question be not one of selection for some end, of which we are at present ignorant.

With regard to the local prevalence of any one colour, including physical colours such as the blue-green referred to by Wallace, I should rather ascribe them to a general process of selection (for protective purposes probably), which rendered such colours most advantageous: by the well-understood process of the survival of any in the least favourable variations, the whole insect fauna might in time become modified in any coloric direction. There is no need at all to assume in such cases any chemical action of soil or climate.

We will now pass to consider the relation of the various varieties naturally occurring to my experimental varieties, my object being briefly to emphasise the point that the varieties which we know to occur may equally well be produced by means of chemical reagents, whether they be varieties in soluble pigments or in "reversible" pigments; and that, therefore, the existence of such varieties is a strong confirmation of the theories (as to the natural relations of the various colours) that I have deduced from my experiments. There is one qualification necessary, however, viz., that I can produce only retrogressive varieties and not progressive, except in the case of the cyanide reactions of certain yellow species. It will, however, probably be found, I believe, that most of the varieties found naturally occurring *are* retrogressive varieties, and that progressive varieties are far scarcer; at least, that is my impression after collecting records of varieties from several years' 'Entomologists,' and other sources. In other words, then, most varieties will be found to be phenomena of *atavism*, or degeneracy to a former less developed state.‡

First of all, though, it may be as well to say a word as to variation among *physical* colours. There are three conceivable directions in which such variations might occur; either one physical colour might replace another, or it might replace a pigment colour, or it might be replaced by a pigment colour. As I have already pointed out,* whenever a replacement of pigmental colours by physical colours occurs, we can only say that the pigment-containing scales have been replaced by unpigmental scales, whose structure is such as to produce the given physical colour. Whether the pigmental scales are merely overlaid by the others, or whether there is an actual absence of pigment, is a highly interesting question, but one into which I am—for want of data—unable to enter here. As examples of such replacement of pigment colour by physical colour, I may refer to the cases of *true* melanism (as distinguished from melanochroism): in the Doubleday collection are specimens of *V. urticæ* with the hind wings dull black, of *C. dominula* and *A. villica* with all the wings *entirely black*, of *T. orbona* with hind wings almost entirely dull black. In recent volumes of the 'Entomologist' have been chronicled a black variety of *L. sibylla* (Entom. xxii. 256), of *A. aglaia* (Entom. xxiii. 350), and so on. To these also I may, perhaps, add the variety of an *Argynnis* noted as having a brilliant *gold* spot on the upper surface (Entom. xxii. 233). In all such cases as this it seems perfectly clear that the unpigmental scales—normally present on part of the wings—have invaded and covered the whole surface; but whether such a variation would occur in a species normally destitute of *any*, e. g., black scales, is another question that I am unable to answer. Has anyone, for instance, ever found a truly melanic variety of such a species as *G. rhamni?* We can only wait for information to settle this crucial point.

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* See the whole question fully discussed in Vines' 'Physiology of Plants.'

† The presence of which, by the way, is wholly hypothetical after all.

‡ It would be deeply interesting to know whether or not specimens showing coloric variation also display any variation in structure. Will any possessor of, *e.g.*, yellow varieties carefully examine the limbs, &c., of his specimens.

It may be noted here that in another sense also a pigment colour may be replaced by a physical, *viz.*, when the pigment is not developed in the normally pigmented scales, and the wing is consequently—usually, at least—white; this, however, is a phenomenon of quite another character from the foregoing, and will be appropriately considered later.

In the second place, we might have physical colours replaced by pigmental; this might happen either by the pigmental scales normally present on a wing invading the territory of the *e. g.* black scales; almost the only example that I have seen noted o this was a specimen of *V. maculata*, with only three black spot altogether on the wings (Doubleday collection): or the pigmen might be developed *in* normally unpigmented scales. Suc varieties as this latter are of very great interest, since—unle I am mistaken—it is in this manner that *all* pigmental colou have originated. Examples of this variation that I have not are the following: a specimen of *A. grossulariata* (in the Doubl day collection) having the ground colour *entirely* yellowish instead of white; in this species the pigment is usually present only as a narrow yellow band: varieties of *E. cardamines* with more than the normal extent of orange (Entom. xxiii. 228): a variety of *A. caia* having white replaced by pink. It must be especially observed that these latter variations are all of them *progressive* in character—advance guards, so to say, of the march towards higher coloric development, and of what we may expect the normal specific type to become in the course of time, if the struggle for existence be sufficiently keen to make such variation advantageous.

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* Entom. xxiii. 313.

The third type of variation in physical colour is when one physical colour is replaced by another—that is to say, when the microscopic structure varies from the normal. *If* the blue of Lycænidæ be physical, then we have examples of this type of variation in the slate-coloured or French grey varieties of *P. alexis*, that have from time to time been chronicled in the 'Entomologist' by Mr. Sabine and others. I would draw especial notice to the fact that exactly similar* artificial varieties have been obtained in my experiments, from which we may conclude that in both cases the effect is due to injury of the fine structure of the scales.† If we consider that the females of the *Lycænæ* preserve the original coloric type, from which the males have advanced to their blue adornment, then we must consider such slate-grey varieties as retrogressive. If, after all, the blue of Lycænidæ should prove to be pigmental, then these varieties would acquire far greater interest, and would be ranked as retrogressive varieties of pigment colours, just as those varieties which must now be considered.

As to other varieties of physical colours, I am unfortunately entirely in the dark; one would expect to find varieties of *Thecla rubi* without the green, in fact, of all the physically green species with this green replaced by bronze-brown, &c. Whether or not such varieties have been found I do not know, but I shall be very glad indeed of any information on the subject.

The naturally occurring varieties of pigmental colours are of peculiar interest to me, since—as I think—they form an independent and corroborative chain of evidence in support of the inferences drawn from my experiments; in fact, we have observation and experiment mutually confirmatory. I need scarcely remind my readers of the broad conclusions as to coloric development summarised last month, *viz.*, that red is evolved from yellow, or occasionally from chestnut; that green is probably evolved from yellow; and that yellow and chestnut are closely related and both developed not *from* any white pigment, but *in* a formerly unpigmented and usually white wing. Now, if these inferences be correct, we may anticipate the following occasional variation to a former state,—retrogressive varieties, that is, or cases o arrested development: we should find yellow varieties of red an pink species; chestnut varieties of a few red species, such a *atalanta*, *acontia*, &c.; and yellow varieties of green species also colourless or very light varieties of yellow and chestnut species, when the pigment, that is, fails to be developed at all; o in a few cases of such non-development of pigment the variety should be black, *e.g.*, in *V. io* and *antiopa*, where the chestnut pigment has been developed on a formerly black wing. It is more questionable whether we should be likely to obtain varieties showing such extreme reversion as white for red: after what has been said in a previous section* on the evolution of red, it is clear that such variation would imply reversion to a very ancient state; still, I should not be surprised at a colourless variety, e.g., *Delius*, where either the evolution of red has been very rapid, or where anyhow the pigment is by no means so stable as in most red species.† A white variety of green species would less surprise me.

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* I have not seen these varieties, but judge merely from the descriptions.

† *Cf.* statements in Entom. xxiv. p. 116.

And secondly, we might get *progressive* varieties, that is, a normally colourless species might be found pale yellow or chestnut, a yellow or chestnut species might be found red, or a yellow might be green; so, too, an unusually *deep* variety of the normal colour might appear. All such variation would be in entire concord with the theories laid down in these articles as to the evolution of colour; and moreover the abnormal colouring would usually (in all probability) be found as the normal type of an allied species or genus. It is, however, clearly unlikely in a very high degree that we should find a red or green variety of a white species; the leap would be too great. There is yet another possibility; if red and green are both descended from yellow, it is, perhaps, conceivable that a pigment normally green should, under abnormal circumstances, be developed as red—or *vice versâ*—by a diversion from the normal metabolic process after reaching the yellow stage. If, however, any *blue* variety of a pigment colour should occur—or *vice versâ*—that would be a phenomenon of an entirely different nature, and one which cannot be considered under this category. I will now briefly refer to a few instances that illustrate the foregoing remarks:—

A. Colourless varieties of chestnut species. There have bee noticed in the 'Entomologist' white varieties of *C. jan* (Entom. xxii. 279),‡ milk-white or "silver" varieties of *L. phlæ* (Entom. xxii. 257 and 279), albino varieties of *C. titho* (Entom. xxii. 287), and a white variety of *C. pamphila* (Doub day collection). It is superfluous to point out the exact similar of these phenomena to those that I have produced by means of chemical reagents; and since, in the latter case, I have shown that the pigment is dissolved out, leaving a pure white wing, it seems a fully justifiable conclusion that these natural albino or "sun-bleached" varieties are likewise due to the absence—*i. e.*, to the non-development—of pigment. In a word, I should regard them, as I have already stated, as unhealthy or pathological cases. (As showing the relationship of yellow and chestnut, I may refer to the yellowish varieties of *A. prunaria* in the Doubleday collection.)

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* Entom. xxiv. pp. 11—13.

† See Entom. xxiv. 13.

‡ These, I presume, are the same as the so-called "sun-bleached" varieties.

B. White (colourless) varieties of yellow species. Theoretically these should be as common as the corresponding varieties of chestnut, but I have not been able to find any record of such varieties. In the Doubleday collection is a specimen of *A. plantaginis* with the hind wings white instead of yellow, a specimen of *R. cratægata* "half washed out," of *S. atomaria* partly whitish, and in the 'Entomologist' (xxiii. 382) is chronicled a variety of *V. io* having yellow replaced by white.

C. Yellow or white varieties of green species. I am acquainted with no instances of such, although they doubtless exist, unless we reckon the fading of some green Geometræ to white as a case in point.

D. Chestnut varieties of red species. These must necessarily be scarce, since so few red species are descended from chestnut. I have no examples to hand, but the want is partly compensated by the colours of subspecies or allied species. In *Vanessa indica*, a subspecies of *atalanta*, the scarlet is replaced by orange or chestnut; and in *Anartia amalthea* the same bands are scarlet in one specimen, and chestnut in another;[*] while my reagents convert the former into a chestnut identical with that normally occurring.

E. Yellow varieties of red species. This seems to be by far the most common form of all coloric variation, a fact at which we need feel no surprise, seeing how closely related are red and yellow, and how very little constitutional disturbance is probably requisite in order to upset the normal processes, and arrest the pigmental development at the yellow stage; in such cases also it is clear that I must regard the variation as a pathological symptom. It is almost superfluous to quote examples of this type of variation, but the following are of interest:—Yellow varieties of *Z. filipendulæ* (Doubleday collection), *A. caia* with red replaced by orange[†] (Doubleday); also bred varieties of *caia* varying from buff to brick-red[‡] (Entom. xxiii. 134), orange varieties of *osis* (Entom. xxiii. 239, 259), *Sesia* with yellow band instead of red (Entom. xxii. 192). It is again evident that suc varieties are identical with those that may be obtained by th action of acids on the normal red species.

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[*] I do not know whether or not this is a sexual difference. Entom. xxiv. p. 91.

[†] In this specimen also the hind wings were more than normally, and the fore wings nearly wholly, *black*. This may be considered an instance of general physiological disturbance.

[‡] Vide *supra*, p. 186.

F. Interchange of red and green.* This is an exceeding interesting, but very difficult variation. We may obtain som collateral evidence by comparing the normal colouring of the tw sexes; for instance, Wallace states that in many S. America Papilios the green spots on the male are represented by red o the female.† There is a variety of *M. margaritaria* chronicled which the cilia are red; this may be a case in point, an some further information may perhaps be gained from the con sideration of an extraordinary variety of *A. galathea*, to which must presently refer. This is emphatically a subject in which f more information is wanted.

Then as to *progressive* pigmental variation, I have alread given a few instances of yellow and orange varieties of normal white species. I greatly regret, however, to have found n records of any red varieties of yellow species; such varieti would be highly interesting—of great theoretical importance—especially if they occurred in species belonging to a genus th already comprised red forms.

Now for the extraordinary variation of *Arge galathea*, alread referred to. It is stated (I presume on good authority) that specimen is known marked with *green and red*. For a long tim this seemed utterly unintelligible and inexplicable to me, but now think it an interesting confirmation of my views. Clearly—after what has been stated in preceding sections—it would b nothing remarkable to find a yellow variety of *A. galathea*; no in the red and green variety, it would seem that, owing to som altogether exceptional metabolic conditions, not only has a yello pigment been developed, but that this has advanced at one boun to its consummation in red, and also simultaneously to its othe and divergent goal—green. It is therefore a highly interestin phenomenon, and one in which more information is certain desirable.

[We must defer the conclusion until September.—Ed.]

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* Wallace remarks, in 'Tropical Nature' (p. 134), that the change from gre to red—from the more refrangible to the less refrangible is in accordance with th law of change which has been shown to accompany expansion (i.e., *by heat*) i inorganic—growth and development in organic—forms. The reference here is t a series of experiments by Mr. Ackroyd, detailed in the 'Chemical News' fo August, 1876, where it is shown that the effect of heat on a large number o chemical compounds is to change the colours from a more to a less refrangib colour. With all respect to Dr. Wallace, I must say that the comparison which h attempts to institute between these phenomena of metachromatism and the d velopment of organic colours is, to say the least of it, forced. Moreover, as matter of fact, I have now shown that there is at least some reason to believe th green was developed from yellow, in which case we have yellow developing, on hand, into the more refrangible green, on the other, into the less refrangible r

† 'Tropical Nature,' 178.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

Development of Red Pigment in Lepidoptera.—Mr. Bowles (*ante*, p. 131), after describing a variety of *Papilio phorcas*, remarks:—"I believe it is a generally accepted theory with evolutionists that yellow was evolved in flowers before red. Perhaps this rule might be applicable also to the animal kingdom, and then may not *P. machaon* be on the road to assume," &c. May I be allowed to point out to Mr. Bowles that the supposition which he so cautiously hazards here is simply what I have been insisting on for the last seventeen months in my articles in the 'Entomologist.'—F. H. Perry Coste; Ravenshoe, Burnt Ash, Lee, S.E.

Emergence of Imago after injury to Larva.—I am able to corroborate the incident related by Mr. Alfred T. M. Mitchell (Entom. 171). In the autumn of 1889, whilst beating bog-myrtle for larvæ, in Delamere Forest, a caterpillar of *Amphidasys betularia* fell into the umbrella, evidently badly hurt, as it had a wound, which bled freely, near the anal segment. The wound, however, healed up, the larva was full-fed in a day or two, and disappeared below the soil. That, I took for granted, would be the last I should see of it; but, in the following summer, it re-appeared in the form of a fine well-developed black female, var. *doubledayaria*. There could be no mistake, as it was the only *betularia* larva I had that year.—J. Arkle; Chester, July 18, 1891.

Red-tailed Bumble Bees eaten by Shrikes.—While in the Minera district last year, I was particularly interested to find red-backed shrikes (*Lanius collurio*, L.) feeding their young with *Bombus lapponicus*, Fabr., and *B. lapidarius*, L., principally the former, and this to a very great extent, as their castings consisted almost entirely of the remains of these insects. I also found *B. muscorum*, L., and *B. lapidarius* impaled on the wild rose by shrikes; these were exhibited at the last meeting of the Lancashire and Cheshire Entomological Society, when a member declared that the bees impale themselves by accident, flying against the spines! Curiously enough, my specimens are impaled through the thorax from beneath! How did the bees manage it? I have never witnessed the impaling process, but it is an acknowledged fact that the "butchers" are guilty of such proceedings, and, moreover, it forms part of their generic character. These birds are well known to feed upon bees, wasps, &c., but it seems strange that they should select the red-tailed species in preference to the more sombre-coloured ones.—R. Newstead; Grosvenor Museum, Chester, July 14, 1891.

Sphodrus leucophthalmus, L., emitting strong Acid-like Fumes.—A few days since I received three specimens of this singular beetle from Mr. Kendrick, of Warrington, who has kindly presented them to this museum. While examining one of them with a lens, I noticed that it gave off a most peculiar odour, which, by placing the insect close to the nostrils, caused quite a stifling sensation. This it continued to do for about five minutes, the fumes gradually becoming less strong, until eventually they were not perceptible. I noticed that while this was taking place the dorsal and ventral plates of the abdominal segment were constantly brought together, and between them there was a very small quantity of a clear fluid, but I did not see this produced into a spray, although I held the insect against a good light, and examined it with a lens. The fumes produced by the insect were almost exactly like those given off by hydrochloric acid. To what practical use this insect can apply this protective agent is somewhat a mystery, as it can have but few, if any, enemies in our cellars, or such places as it is known to frequent. The same may be said of *Blaps mucronata*, which in like manner is said to produce an odour singularly unpleasant. This latter insect occurs pretty freely with us, but, although I have handled many specimens, I have never yet perceived any odour. I may here add that *Carabus granulatus* has the power of emitting a very strong fluid. I was holding one in my hand the other day when it ejected some in my face, producing a most intense burning pain; this was quickly removed by the application of cold water. These facts, although new to me, may be old to many, but some may not have heard of them, and be interested.—R. NEWSTEAD; Grosvenor Museum, Chester.

PLUSIA MONETA IN BRITAIN, 1891.—I had the good fortune to capture, at light, on the evening of July 11th, the sixth British specimen of *Plusia moneta*, Fab. It is a fine specimen in perfect condition, rather larger than that figured in the 'Entomologist' for last September (xxiii. pl. iii. fig. 6). Its occurrence so far inland as the Guildford district in 1891 points to its having established itself as a British species. It is an interesting addition to our fauna, not only on account of its beauty, but because these records imply the extension of the range of the species into the north-western portion of the palæarctic region. I quote Staudinger's 'Catalogue' on the subject of the distribution of another eastern species—*Plusia consona*, F. —for comparison with that of *P. moneta*:—"*P. consona*, Fabr. Sax.; Austr. Hung.; Bulg.; Ross. m. or.; ? Parisii (1)." In the Parisian example quoted we see the same tendency to migration in a westerly direction. "*Plusia illustris*, Fabr. Germ. m. (c. occ.); Helv.; Gal. m. or.; Ped.; Hung.; Corcyra; Ural." Here we have another eastern species extending into Western Germany. Staudinger does not give "Angl.," but Stainton's 'Manual' states that it has occurred on Salisbury Plain. The distribution of *Plusia modesta*, Hb., is much the same as that of *P. bractea*, Fabr., but *P. modesta* has never been recorded in Britain, though it occurs as far west as Paris. May we not hope, considering the migratory character of the genus, that *P. consona* and *modesta* may some day be added to, and *P. illustris* re-instated in, the list of British Lepidoptera? I shall have the specimen by me to show to anyone who may wish to see it for the next six weeks; after that it will be in the collection of Mr. Bernard Crocker, of Plymouth.—HENRY C. LANG; Rose Hill, Albury, Guildford.

LARVÆ OF EUBOLIA LIMITATA (MENSURARIA) AND PLUSIA PULCHRINA.— Book after book one takes up, and the larvæ of these common moths are dismissed as rather undiscovered things. Here is an opportunity for some young entomologist! Beat nettles into a newspaper at the end of May and the beginning of June. It is worth while. You will come across larvæ o good moths, particularly of the *Plusia* family; and a bred moth, even if i be common, is often worth any number of netted ones. There will also f to your share a pea-green, very un-Geometer-like, caterpillar, with a hump sort of back, and a whitish yellowish line along each side. It looks f more like a *Noctua*, but it is the larva of *E. limitata*. It spins a whiti silken cocoon among the nettle leaves, and is easily reared. I beat lots nettles this season, in the hope of being able to record an accurate descri tion (the above is from memory), but I started too late (June 13th), and d not secure a single caterpillar, except a solitary delicately green, leech-like one, with a small green head and segments, gradually increasing in size. It was all green, legs and claspers as well, without a single stripe or ornament, except a black lateral mark on each cheek, which, together with its quick spasmodic jerkings from side to side, gave it a vicious look. It was a larva of *P. pulchrina*. After spinning its white silken cocoon among nettle leaves, it emerged, a fine specimen, on the 5th of July.—J. ARKLE; Chester, July 18, 1891.

VARIATION IN PUPA OF SATYRUS MEGÆRA.—Out of a brood of about five dozen larvæ of *S. megæra* reared from the egg, I have obtained a very marked variety of the pupa, in which the usual emerald-green colour is replaced by sooty black, whence the double dorsal chain of bright yellow spots stands out in marked relief, giving the species an altogether different and, if possible, more handsome appearance. There are about one-fourth of the black variety, and four or five others are intermediate between bright green and black, being of a dull bice; the remainder call for no special notice. The larvæ were all reared under precisely similar conditions, on *Poa annua* and *Dactylis glomerata*, and the black pupæ were among the earliest to assume that state. —F. W. HAWES; Grasmere, Torrington Park, N.

NOTE ON THE HATCHING OF NEMEOPHILA PLANTAGINIS.—On June 13th I had several specimens of *N. plantaginis* emerge, a pair of which I placed in a cage, and saw them *in cop.* on the 14th. Eggs were laid on the 16th, all of which hatched on the 18th. This seems to me a very rapid proceeding, as the weather was not remarkably hot at the time, and they were not forced in any way, being virtually in the open air, but not in the sunshine. The female lived quite a fortnight longer, and laid more eggs, all of which were infertile. The larvæ have fed up very well, and are, I should think, nearly their full size now.—MARK H. WINKLEY; Streatham, July 21, 1891.

CHŒROCAMPA NERII.—In a collection of insects formed by the late Mr. Crozier, the well-known Manchester artist, mostly some forty to fifty years ago, and which has lately come into the possession of Mr. T. Ray Hardy and Mr. R. Standen, of Owen's College, was found a very fine specimen of *C. nerii*, brilliant in colour and perfect in condition, with the label, "Prestwich, 1847." This specimen the owners have generously allowed me to add to my collection. I may say that another individual of this species is in the museum collection of Owen's College, having been captured at light on a street-lamp in Prestwich five or six years ago. There are, therefore, now two *nerii* known from this locality—a locality rich in good things in time past, *e.g.*, *Catocala fraxini* (at Agecroft), *Saperda scalaris* (Mere and Prestwich Cloughs), &c.—J. COSMO MELVILL; Prestwich, July 3, 1891.

[Previous records of *C. nerii* are as follows:—Stainton's 'Manual,' 1857, three specimens, Dover, Teignmouth, Brighton. 'Entomologist's Weekly Intelligencer,' ii. 172, one imago, Brighton, 16th August, 1857; vii. 140, two larvæ, Eastbourne, 1860. 'Weekly Entomologist,' i. 12, one imago, Hastings, 2nd August, 1862. 'Entomologist,' iii. 364, one imago, Sheffield, 14th September, 1867: iv. 162. 'Entomologist's Monthly Magazine,' v. 172, two imagines?, St. Leonard's October, 1868. 'Entomologist,' xiii. 263, one imago, Crieff, Perthshire, July ?, 1873; vii. 290, one imago, near Lewes, 3rd September, 1874. 'Ent. Mo. Mag.' xiii. 158, one imago, Hemel Hempstead, 10th October, 1876. 'Entomologist,' xvii. 238, one imago, Tottenham, 24th September, 1884; one imago, Eastbourne, 26th September, 1884. 'Ent. Mo. Mag.' xxii. 40. 'Entomologist,' xviii. 324, one imago, Hartlepool, 23rd July, 1885; xix. 250, one imago, Brighton, 7th September, 1886. 'Entomologist,' xxii. 258, one imago, Poplar, 20th September, 1889. 'Ent. Mo. Mag.' xxvi. 328, one imago, Dartmouth, 26th September, 1890.—Ed.]

LITHOSIA QUADRA AT NEW CROSS.—It may be of interest to note that I captured, on July 15th, a female specimen of *Lithosia quadra*. It was on a garden wall near New Cross Station, and is in fine condition. Is it not rather an unusual insect to be found in South London?—ALBERT E. COOK; 31, Lower Road, Rotherhithe, July 18, 1891.

HABITS OF LEUCOPHASIA SINAPIS.—In reply to Mr. H. S. Fremlin's enquiry respecting the habits of *Leucophasia sinapis* (Entom. 172), I beg to say that when catching butterflies in the neighbourhood of Wiesbaden, on July 29th, 1879, I noticed some examples of *L. sinapis* flying over a corn-field, and settling on the stems of the corn. On approaching one of these the insect would fly off a short distance and again settle. I took three specimens. The time would be about 5 o'clock in the afternoon. Perhaps the butterflies were settling for the night.—ALFRED SICH; Villa Amalinda, Burlington Lane, Chiswick, Middlesex, July 18, 1891.

NOTES FROM BROCKENHURST.—On the 30th May last I went Brockenhurst, and spent the following week in collecting Lepidoptera. Th weather was all that could be wished for, being warm, with bright sunshi every day. The following are the species I took or saw:—Hybernate specimens of *Gonopteryx rhamni* were fairly numerous during the first or three days, but in a very battered condition. The females were mo plentiful than the males. *Pieris rapæ* and *P. napi* were common. *Argyn euphrosyne* was plentiful and in good condition, evidently not having be out long. *Nemeobius lucina* was fairly common in certain localities, se specimens in one morning being the most I took. *Pararge egeria* abundant, but in rather worn condition. *P. megæra* was represented two specimens only. I took one hybernated specimen of *Vanessa p chloros* on the 1st June, and also saw another on the 5th. *Thecla rubi* not very common, four specimens being all I took. *Syrichthus malvæ Nisoniades tages* were represented by three or four specimens ea *Cœnonympha pamphilus* and *Lycæna icarus* were common. I was mu surprised at not seeing a single specimen of *Euchloë cardamines*; as season appeared to be very late, I fully expected to meet with it. Amo the Nocturni there was not much to be done, very few moths being o *Venilia macularia* and *Panagra petraria* were fairly abundant, and obtained a few *Eurymene dolabraria*. During the first two days *Bupal piniaria* was to be seen flying about the tops of fir-trees. On the heat *Ematurga atomaria* was common, with two or three specimens of *Bomb rubi*. *Euchelia jacobææ*, *Spilosoma mendica*, and *Euclidia glyphica* we each represented by one specimen. Night-work was not very encouragin After what I had heard I did not attempt sugaring at all, while three four nights mothing in the woods at dusk, and later, with the aid of lantern, produced nil. The season seemed to be a very late one, sever of the trees and shrubs being barely in leaf. It was my first visit to the New Forest, and, considering the wet and cold weather we had during May, the result was better than I anticipated.—PHILIP W. RIDLEY; 2, Camden Terrace, Bath.

NOTES FROM READING.—Yesterday, the 16th July, a friend and myself set out to catch *Asthena blomeri*, *Minoa euphorbiata*, and *Thecla w-album*. We took from 50 to 60 *blomeri*, 6 *euphorbiata*, 1 *T. w-album* (saw several others); and, in addition, got some 40 or 50 *Abraxas ulmata*. I also had the fortune to find one more female *Stauropus fagi*. *S. fagi* occupied its usual position, *i. e.*, the N.E. side of a moderately-sized beech tree. *A. blomeri* we found chiefly on the trunks, and was somewhat difficult to capture; it has a habit of flying off and making for the underwood on the approach of its would-be captor, who must be nimble to secure it before it reaches a place of safety.—J. CLARKE; Reading, July 17, 1891.

VARIETY OF HEPIALUS LUPULINUS.—A very light specimen of *Hepialus lupulinus* was taken by me, at rest on an oak fence in Putney Park Lane, on June 14th. All four wings are of a dirty white, with no markings whatever.—CHARLES MAXSTED; 7, Church Terrace, Castelnau, Barnes, July 5, 1891.

[Mr. Adamson (Entom. xvi. 162) records a white specimen of *H. lupulinus* from Croydon, but this example had a broad tawny border on the costal margin, and a band of the same colour on the outer and inner margins. On page 187 of the same volume, Mr. Swinton says that white varieties of the species were common on the Old Guildford racecourse the first week in June. He adds, "I have been endeavouring to catch one quite white, but have not hitherto succeeded." Probably specimens similar to that described by Mr. Adamson are not scarce if looked for, but *H. lupulinus* is such a common moth that collectors do not perhaps give the species much attention. Some years ago I obtained a number of interesting varieties of this species in one evening at Kingsbury; amongst them were several of the white form, and since then I have frequently met with this variety in other places.—R. S.]

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*July 1st*, 1891.—Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. The Rev. John Isabell, of St. Sennen Rectory, Penzance, was elected a Fellow, and the Rev. John Seymour St. John, B.A., was admitted into the Society. Mr. Jacoby exhibited a specimen of a species of Coleoptera belonging to the family Galerucidæ, with the maxillary palpi extraordinarily developed. The Rev. Canon Fowler, on behalf of Mr. Wroughton, Conservator of Forests, Poona, exhibited specimens of a bug imitating an ant, *Polyrachis spiniger*, and of a spider imitating a species of *Mutilla*, and read the following notes:—"I have taken a good many specimens of a bug which has achieved a very fair imitation of *Polyrachis spiniger* (under the same stone with which it may be found), even to the extent of evolving a pedicle and spines in what, were it an ant, would be its metanotum. Curiously enough, however, these spines are apparently not alike in any two specimens. Is it that this bug is still waiting for one of its race to accidentally sport spines more like those of *P. spiniger*, and thus to set the ball of evolution rolling afresh? or is it that the present rough copy of *spiniger's* spines is found sufficient to deceive? The bug has also been found in the Nilgherries. Mr. Rothney remarks on the above species:—'I have not found the species mimicking *Mutilla;* but in Calcutta and Barrackpore, where *P. spiniger* is a tree ant, forming its net by spinning together the twigs of a shrub, the mimicking bug also assumes arboreal habits, and may be found on the trunks of trees with the ants.'" Mr. Porritt exhibited living specimens of *Eupithecia extensaria* and *Geometra smaragdaria:* the position assumed by the former proved conclusively that it had rightly been placed in the genus *Eupithecia.* Mr. Crowley exhibited two specimens of a *Papilio* from the Khasia hills, belonging to an undescribed species allied to *P. papone*, sub-generic section *Chilades.* Col. Swinhoe remarked that he possessed a specimen from Northern Burmah. Mr. Moore and others took part in the discussion which followed. Mr. Dallas Beeching exhibited a specimen of *Plusia moneta*, recently taken by himself at High Woods, Tonbridge, and specimens of *Gonepteryx cleopatra*, lent him for exhibition, which were alleged to have come from the same locality. Mr. Algernon Chapman exhibited the larva of *Micropteryx calthella*, and read the following notes:—"The larvæ were obtained by placing moths in a cage with damp moss, dead leaves, and other *débris* off the surface of the ground. Into this the moths crept to a depth of half an inch, forcing their way into narrow cavities, and laid their eggs in groups of six or twelve. The eggs are clothed with fine hairs, tipped with refractive particles. The larva, about a millimetre in length, possesses on each segment eight processes of a globular form raised on a very slight pedicle. Besides the thoracic legs, each of the abdominal segments (eight) possesses a pair of minute jointed legs of the same type as the thoracic. There are also a pair of long jointed antennæ." Col. Swinhoe read a paper "On a new species of Heterocera from the Khasia Hills." Mr. Crowley read a paper "On a new species of *Prothoe.*" Mr. C. J. Gahan read a paper "On the South American species of *Diabrotica,*" Part II., being a continuation of Dr. Baly's paper on the same genus, published in the Society's Transactions for 1890, Part I. Mr. W. F. Kirby communicated a paper entitled "Notes on the Orthopterous family Mecopodidæ." Prof. Westwood communicated a paper entitled "Notes on *Siphonophora artocarpi,*" referring to an appendage of the eyes which had been overlooked in his previous description.—H. Goss & W. W. Fowler, *Hon. Secretaries.*

South London Entomological and Natural History Society.—*June 25th*, 1891.—Mr. W. H. Tugwell, President, in the chair. Mr. West exhibited bred examples of *Sesia formiciformis*, and remarked that he had bred a large number of ichneumons from the pupæ, and many others, he thought, were standing over. Mr. C. A. Briggs, a specimen of *Pieris brassicæ*, L., bred from pupæ received from Yorkshire, having one of the antennæ much smaller than the other, although fully developed. Mr. Croker, an hermaphrodite specimen of *Coremia ferrugata*, Clerck, a variety of *Spilosoma lubricipeda*, Esp., very strongly marked for the southern form of the species. Mr. Barker, a specimen of *Epinephele hyperanthes*, L., one of the inferior wings being about a quarter the size of the other; the ocelli were, however, to be seen. Mr. H. Moore, several species of locust. The Secretary read a list, compiled by Mr. Adkin, of Lepidoptera taken on the Society's excursion to Eynesford, Kent, on Saturday, the 20th June, which was conducted by Mr. John T. Carrington. A list of the Coleoptera, compiled by Mr. Lewcock, was also read. Mr. Tugwell communicated notes on a botanical ramble from Leatherhead, over Mickleham Downs, to Dorking, illustrating his remarks by examples of the plants collected, and referring to the larvæ of the Lepidoptera which were to be found feeding on them.

July 9th, 1891.—The President in the chair. Mr. R. Adkin exhibited, on behalf of Mr. E. Sabine, of Erith, a series of *Lycæna icarus*, Rott., collected at Snodland during the spring, and showing great variation; some of the males closely approached the colour of *L. bellargus*, Rott.; in one, the marginal black dots extended into the fringes; in one of the specimens the under side was of a smoky grey colour, the white rings of the ocelli being absent. Among the females were many blue forms, and in the under sides of many there was considerable variation. Mr. Adkin also exhibited living larvæ of *Euclidia glyphica*, L., reared upon white clover. Mr. Oldham, a light form of *Argynnis euphrosyne*, L., a yellow variety of *Pieris rapæ*, L., and a dark variety of *P. napi*, L. Mr. C. A. Briggs, a few melanic specimens of *Sphinx ligustri*, L., from the London district. Mr. Tugwell, *Sesia sphegiformis*, Fabr., and stems, showing position of pupæ *in situ*, from Tilgate Forest, and made some observations thereon. Some remarks were made by members as to varieties being mobbed by typical forms of the species. The Rev. J. W. Horsley, of Woolwich, exhibited and remarked on a series of shells, those of *Helix nemoralis* and *H. hortensis* in almost every variety of banding and colouring. He had made a list of 89 band varieties.—H. W. Barker, *Hon. Sec.*

OBITUARY.

George Perry Shearwood died 7th July, 1891, aged 62. The earlier portion of his life was spent in India, where he for some years carried on a successful business, from which he obtained a considerable competency, and retired to this country at a comparatively early age. It was while in India that he contracted a taste for Natural History, and commenced collecting such objects as they came in his way. On returning home his attention was devoted chiefly to ferns, of which he at one time had a very large number of living examples, and Lepidoptera, to which he gave a large share of his leisure, the British species being his especial favourites, and of these he amassed a very considerable and fairly complete collection. He also took great interest in rearing and preserving the larvæ of Lepidoptera: a rare or little-known species in its larval state being one of his great delights. By those who knew him in the field will his loss be most felt, his genial nature and utter disregard of fatigue rendering him a most agreeable companion. He thoroughly enjoyed an expedition in quest of some pet species, and it was on one of these occasions that he met with an accident that incapacitated him for some time from active work. Having lingered too long in quest of *Erastria venustula*, which he had been seeking in the Horsham district, and thus missed the last passenger train by which he might reach home, he sought other means of accomplishing the journey before resorting to the extremity of a forty miles' walk. This presented itself in the form of a friendly driver of a goods train, who eventually deposited him, in the small hours of the morning, on the line some distance from a station, and to gain the road it was necessary for him to scale a high spiked fence; this he accomplished without difficulty, but in his descent his hand was caught by one of the spikes, and torn almost through. Nothing daunted by the pain and loss of blood, he bound it up as best he could, and made for home, rousing his doctor on the way, under whose care he remained for some weeks, and, on recovery, appeared to regard with pride the scar which he carried to the grave. He contributed little to entomological literature, beyond a few notes in the 'Entomologist' upon interesting captures that he had made from time to time, and, so far as we are aware, he has left no systematic record of his doings. He was one of the earliest members of the South London Entomological Society, to which he belonged until his death. Although possessed of a considerable fortune on his retirement from active business, a too implicit faith in sundry commercial undertakings considerably reduced his income. This perhaps preyed upon his mind, and, an attack of paralysis supervening, he was placed in a helpless condition, and his brain seriously affected; but even during his last years, although so terribly afflicted, he derived relief and pleasure from the re-arrangement of the collections that he had formed during his earlier life. We understand that these are likely shortly to be offered at auction.—(R. A.)

On the 12th inst., after months of suffering brought on by an attack of influenza, Mr. EDWARD RALPH PEARSON, of Wallington, Northumberland, passed to his rest. Turning his trade, which was that of a joiner, to meet his entomological aspirations, he, in his spare hours, made himself a cabinet, which, with its very representative collection of insects found in the North of England, soon became an object of general interest and admiration. In addition to his local fame as an entomologist, Mr. Pearson was also a successful horticulturist. Amongst the many good insects in his cabinet, his collection included long and fine Wallington series of *Sphinx convolvuli*, *Thyatira batis*, and *Plusia bractea*. It is also worth recording that he had, some twenty years ago, captured, at a short distance from his home, a fine specimen of *Vanessa antiopa*. To many entomologists Mr. Pearson was well known as a correspondent and ready helper, and his early death, at the age of 56, will be regretted by all who knew his sterling worth.—(J. A.)

It is with deep regret I have to announce the sudden death of my old friend P. F. J. LOWREY, which took place at his residence at Clapham Park on the 24th July, 1891, at the early age of thirty years. He was an ardent and careful collector of Lepidoptera, caring little for the exchange system of collecting; his fine collection of butterflies is formed principally of his own captures, and comprise many of our most local species; it includes specimens of *Vanessa antiopa*, one taken by himself at Camberwell eleven years ago. Only a month since I had the pleasure of his company on a visit to the Isle of Wight, in search of one of his favourite butterflies, *Melitæa cinxia*. During the last fourteen years he has contributed notes to the 'Entomologist.' He was much devoted to the study of Ornithology, and was well acquainted with all rural recreations. His loss will be deeply felt by all those who had the fortune of his friendship, as he was a true friend to all.—(F. W. F.)

With very great regret we have also to record the death of Mr. FERDINAND GRUT, of Southwark. A further notice will be given in the September number.—ED.

THE ENTOMOLOGIST.

Vol. XXIV.] SEPTEMBER, 1891. [No. 340.

TWO AND A HALF HOURS' INVESTIGATION OF THE ENTOMOLOGY OF OXSHOTT.

By T. R. Billups, F.E.S.

On the 8th of July last I went down to that pleasant and easily accessible locality in Surrey known as Oxshott. I was accompanied by my friend Mr. A. Beaumont, and it is perhaps unnecessary to say that our object was to add, if possible, some rare insects to our collections. As the district visited by us is now well known to most of our London entomologists, I need hardly enlarge upon its physical or botanical features. The particular day referred to was not, from a meteorological point of view, a favourable one for collecting, and our captures were consequently few and far between. A heavy thunderstorm brought our proceedings to an early termination, and caused us to beat a hasty retreat to the railway station. On our way to the place of shelter we happened to pass by a private road bordered on each side by a sand-bank, but as the rain was falling in a veritable torrent, we could only glance at the position then, making mental notes that the ground was of a promising character, and that we ought to visit it again under more favourable circumstances. On the morning of the 11th July the sun shone brilliantly in a cloudless sky, the wind was blowing gently from the south-west; altogether the day promised to be all that could be desired, and, as I was free, I determined to investigate the entomological capabilities of the spot which had so favourably impressed me on my former visit to Oxshott. Unfortunately I had to make the second expedition by myself, as Mr. Beaumont was not able to join me. The following is a list of some of the species captured by me in the short space of 150 minutes:—

Hymenoptera.—Amongst the Heterogyna and Fossorial were *Formica rufa* and *Myrmica scabrinoides*, very plentiful. *Myrmosa melanocephala*, both sexes of this not common insect were taken, the males being on flowers. *Pompilus viaticus* and *P. gibbus* were very common; a solitary male of the rarer *P. pectinipes* was also taken. *Priocnemis fuscus* and *Ammophila campestris* were plentiful. *Tachytes pectinipes* and *Miscophus bicolor*, the latter and rarer species being very difficult to catch. *Diodontus minutus* and *D. luperus* were both taken, as also several specimens of *Pemphredon lethifer*. *Mimesa bicolor* and *M. equestris* were swept from Umbelliferæ; several specimens off *Harpactus tumidus*. Two specimens of *Gorytes mystaceus*, as also *Mellinus arvensis*, were taken, the two latter being from the leaves of a stunted oak, where they were apparently in search of lepidopterous larvæ. *Cerceris arenaria* was common. *Trypoxylon figulus* and *T. clavicerum* were taken, but not commonly. Amongst the Crabros, a solitary specimen of the rare *C. capitosus* fell to my net, the other species taken being *podagricus*, *varius*, *wesmaeli*, *elongatulus*, *vagabundus*, *4-maculatus*, *cribrarius*, and *peltarius*. *Entomognathus brevis* was very abundant. The Diploptera were represented by *Vespa germanica*, *Odynerus parietum*, and a single female of *Eumenes coarctata*. In the family Anthophila *Colletes succincta* and *C. fodiens* were common on the ragwort (*Senecio jacobæa*), while the bramble-flowers swarmed with *Prosopis communis* and *P. hyalinata*. *Sphecodes gibbus*, *pilifrons*, *similis*, and *variegatus* were captured at the bloom of thistles; and two specimens of the rare *S. longulus* were taken by sweeping. *Halictus cylindricus*, *albipes*, and *tumulorum* were in plenty, while specimens of *H. punctatissimus* were scarce. *Andrena bicolor* was common at the bloom of the mallow (*Malva sylvestris*); *A. fulvicrus* and *A. afzeliella* were also plentiful, but *A. chrysoscelis* was represented by two specimens from the bloom of Umbelliferæ. *Nomada fabriciana* and *N. furva* were both taken, but much worn. Two specimens of *Cœlioxys elongata* and one specimen undetermined complete the list of captures of the Hymenoptera-Aculeata.

Chrysididæ.—In this family I succeeded in taking three specimens of the rare *Elampus panzeri*, by sweeping a small clump of viper's bugloss (*Echium vulgare*). Several examples of *Homalus auratus* and *Chrysis ignita* occurred, as also one specimen of the rare *C. succincta*.

Ichneumonidæ.—As my captures in this family were very numerous, and not all at the present determined, I propose giving the names of those identified, simply stating that they were all taken by sweeping. *Ichneumon xanthorius*, *I. latrator*, *Exophanes exulans* (both sexes), *Amblyteles palliatorius*, *A. castigator*, *Platylabus pedatorius*, *P. dimidiatus*, *Stilpnus gagates*, *Phygadeuon brevis*, *P. jejunator*, *P. variabilis*, *P. fumator*, *Hemiteles tenebricosus*, *Aptesis hemiptera*, *Pezomachus rufulus*, *Campoplex erythrogaster*, *C. pugiltator*, *Sagaritis latrator*, *Limneria crassicornis*, *L. unicinata*, *L. interrupta*, *L. ovata*, *Canidia pusilla*, *Banchus pictus, Perilissus pictilis, P. variator, P. vernalis, Tryphon consobrinus, Adelognathus ruthei, Polyblastus varitarsus, Ctenisçus sexcinctus, Exochus carbonator, E. mansuetor, Bassus bizonarius, B. cinctus, B. exultans, B. lætatorius, Pimpla scanica, P. examinator, P. graminella, Lissonota sulphurifera, L. cylindrator, L. variabilis.* The subfamily Braconidæ had representatives in *Bracon roberti, B. terebella, B. discoideus, Rhogas circumscriptus, Chelonus inanitus, C. submuticus,* and three specimens of the rare *C. carbonator. Microgaster globatus* and *M. annulipes* were common. *Microdus tumidulus, Microplitis spectablis, Meteorus chrysopthalmus, M. pulchricornis, Aphæreta cephalotes, Cœlinius niger* (several of both sexes), and *Rhizarcha areolaris.* In the family Oxyura there were taken *Proctotrypes gravidator* and *P. viator, Megaspilus alutaceus, Galesus fuscipennis, Paramesius claviscapus,* and *Spilomicrus nigripes.* In the family of Chalcididæ the following were met with: five specimens of the very curious *Eupelmus degeeri, Lamprotatus splendens, Pteromalus tibialis,* and *P. fasciventris.* The Cynipidæ, or Gall-flies, were represented by *Cynips kollari* and *Rhodites rosæ.* Amongst the Tenthredinidæ, or Sawflies, the following were taken: *Tenthredo viridis, Tenthredopsis nigricollis* (both sexes), common on the Umbelliferæ. *Dolerus intermedius, D. fulviventris* (the latter being very plentiful amongst the horse-tails). *Strongylogaster cingulatus* (by sweeping *Pteris aquilina*), *Selandria stramineipes* and *S. morio* (both by beating birch). *Taxonus glabratus* and *Athalia rosæ* were very common. *Dineura viridiorsata* and *Cladius pectinicornis* were also plentiful. *Nematus capreæ* in all its varieties was very plentiful; *N. myosotidis* and *N. ribesii* were numerous. Several specimens of the not common *Cephus phthiscus* were also taken.

Diptera.—In this Order I was especially fortunate, capturing several species that I have no doubt will prove interesting to dipterists, more particularly as I find that four of the species are placed at the end of Mr. Verrall's List of British Diptera as reputed British; another is placed in his list in italics, as though he had doubt as to its being a British species; while two other species do not appear in his list at all, unless, indeed, he has them under another synonym. *Oxycera pulchella,* five of this pretty little species of Stratiomydæ were taken, as also two of *O. terminata;* this latter species, which I had previously bred from a pupa found in my own garden on the 16th of July last year, is one of Mr. Verrall's reputed British. *Chloromyia formosa, Beris clavipes* and *B. chalybeata* were common. A single specimen of *Tabanus bromius* was taken, while *Chrysops cæcutiens* and *C. relictus* were perfect pests. *Chrysophilus auratus* literally swarmed, while *Leptogaster cylindricator, Dioctria baumhauerri,* and *Thereva fulva* were plentiful. Two specimens of the curious *Oncodes gibbosus* fell to my net, while *Hybos femoratus, Rham-*

phomyia sulcata, and *Empis livida* abounded. Several specimens of the pretty *Argyra leucocephala* and *Pipunculus ater* were taken, as also two specimens of *P. geniculatus*; of the latter species Mr. Verrall is probably doubtful, as I find it in italics. *Pipizella annulata*, one specimen of which was captured, Dr. Meade says rare; Mr. Verrall places it with the reputed British. Several specimens of *Chilosia œstracea* were taken, while *Sphærophoria scripta*, *S. menthastri*, *Xanthogramma ornatum*, *Volucella bombylans*, and *V. pellucens* were plentiful. I only found a single specimen of each of *Sericomyia borealis*, *Eristalis floreus*, *Helophilus pendulus*, and *Xylota segnis*. *Chrysotoxum arcuatum*, *C. bicinctum*, *Sicus ferrugineus*, *Myopa buccata*, and *Oliviera lateralis* were all taken. *Phorocera concinnata*, *Thelaira leucozona*, and *Mydæa urbana* were plentiful. *Cordylura albipes* seemed scarce. Two specimens of another of Mr. Verrall's reputed British Diptera were taken in *Clidogastra punctipes*, Mg., a single specimen of the very beautiful *Pteropæcila lamed*, and several of *Pteropæctria afflicta* and *P. frondescentia* were captured, as were also *Trypeta onotrophes* and *Acidia cognata*, which seemed common. The very pretty *Trypeta florescentiæ* was plentiful, while three specimens of another rarity, *Oxyphora* (*Tephritis*, L.) *arnicæ*, Fln., were taken; this is also reputed British by Mr. Verrall. *Sapromyza platycephala*, Lw., and *Chlorops hypostigma*, both of which species were taken, terminate the list of Diptera, the two latter species being those I previously alluded to as not appearing in Mr. Verrall's list.

In Hemiptera some 17 species were taken, while Coleoptera numbered 27 species, as also three of Orthoptera; but as I may have to give a future note on several so far undetermined species, both of Ichneumonidæ and Diptera, I purposely omit the names now, as this paper is already longer than I had anticipated it would be. I must, however, tender my best thanks to my friend Mr. Edward Saunders for his kindly identification of the obscure Hymenoptera, and also to Dr. Meade for his invaluable aid in identifying some of the Diptera.

NOTE ON *SESIA SPHEGIFORMIS*, Fabr.

By W. H. Tugwell.

For many years past I have had the pleasure of studying this interesting species in one of its most favoured habitats, viz., Tilgate Forest, Sussex, and possibly a few notes may be useful to others.

The species is widely distributed over a fairly large area, where its food-plant, alder, occurs; it does not affect densely wooded plantations, but rather the outskirts, and isolated bushes or shrubs. The larvæ may be found in stems no thicker than your little finger, to that as large as a man's leg, and they feed at least three years; in fact they are in larval state during part of four years, *viz.*, ova deposited, say June, 1891, will not pupate until May, 1894. The larva does not, I think, feed the last spring of its larval life, but it finishes its burrow and provides for the future exit of imago; so that if, in the spring, one finds fresh frass being ejected from the end of the burrow, it is useless to take it that year, as it is almost impossible to rear half-fed larvæ, save, perhaps, in cases where one has growing plants to introduce them in; generally it will be found much better to note the tree, and leave them until the following May. They only remain in pupa about a month, and may be found as imagines from end of May until first week in July. My first date of capture of perfect insect, at large, is *May 29th*, on which date, in 1882, an early season, I and a friend captured four examples,—two females, at large, one of them flying, apparently depositing ova; and a pair *in cop.* One cold and backward season I took a female, just as it emerged from pupa, on *July 6th.* The general time, however, is about the first to second week in June. They are not often found at large, unless you have a virgin female, and then, given a favourable day, you possibly may get good sport, but not always.

Thus, this June 19th, I took two virgin females, that I had bred, to Tilgate Forest, selected a likely spot, and had splendid sport; in fact, took twenty-four fine males. This was the best take I ever had; the day was all that could be desired, and the result most satisfactory.

A week later I again took two virgin moths to Tilgate, with weather, so far as one could judge, equally favourable; but, for result, I only saw one male. This was surprising, as it was hardly possible that the males were exhausted; it was rather, I am disposed to think, some special meteorological reason unappreciable to our blunter senses. (N.B.—The wind was S.-W. and soft.)

It is curious to watch for the approach of the males. They come up to the caged female, in a booming flight that is unmistakable, and are most readily captured; but if once really frightened, then they are off like a rocket; the eye cannot follow their rapid flight; so different to the would-be lover. It is very rare, indeed, that you can find a male on flight, except you are aided by a virgin moth; occasionally you may detect one sitting on a leaf, but very rarely. Your best chance of success is in breeding, and possibly by attraction, although this fails sometimes. I have never had but this year perfect success, against which I could name a lot of failures, so much depends on the weather; you may get your females out and not have a favourable day until the freshness of your moths has gone by, and thus lose your chance for the season.

This 1891 is the best year for the species I ever experienced. By breeding and captures I obtained forty-seven fine examples.

July, 1891.

ENTOMOLOGY OF GRANADA AND NEIGHBOURHOOD.

By the Rev. F. A. Walker, D.D., F.E.S.

(Concluded from p. 163.)

Granada.

Coleoptera. — *Acis acuminata*, *Oxytherea stictica*, *Cetonia hirtella*, *C. squalida*, *C. floricola*, *C. aurata*, *C. opaca*, *Hoplia aulica*, *Anisoplia horticola*, *Clythra vicina*, *Trichodes octopunctatus*, *Coccinella septempunctata*, *Silpha rugosa*, *Heliotaurus ruficollis*, *Atenchus laticollis*, *Dolichosoma nobilis*, *Phytæcia virescens*, *Helops* (sp. incert.), *Tentyria* (sp. incert.), *Gymnopleurus flagellatus*, *Gonioctena ægrota*, *Chrysomela palustris*.

Lepidoptera-Rhopalocera.—*Papilio machaon*, *P. podalirius*, *Pieris brassicæ*, *P. rapæ*, *P. daplidice*, *Gonepteryx rhamni*, *Colias edusa*, *C. hyale*, *Zegris menestho*, *Euchloë belemia* var. *glauce*, *E. eupheno*, *Vanessa atalanta*, *V. cardui*, *V. urticæ*, *Satyrus meone*, *S. megæra*, *S. mæra*, *Epinephele ianira*, *E. pasiphæ*, *E. ida*, *Arge psyche*, *A. thetis*, *Melitæa phœbe*, *M. cinxia*, *Chrysophanus phlœas*, *Polyommatus alexis*, *P. adonis*, *P. agestis*, *P. hylas*, *Erynnis altheæ*, *Pyrgus sao*, *P. proto*.

Lepidoptera-Heterocera. — *Macroglossa stellatarum*, *Ino statices*, *Saturnia pyri*, *Cerura vinula*, *Arctia villica*, *Plusia gamma*, *Agrotis segetum*, *Aspilates citraria*, *Synaphe moldavica*, *Rhodostrophia vibicaria*.

Diptera.—*Tabanus ater*, *T. autumnalis*, *Sarcophaga* (sp. nov. ?), not in B. M., nor described in Schiner's work; proposed to call this sp. *granadensis*), *Tachinus ? fera ?*, *Gonia* (sp. incert.), *Sarcophaga*, *Tabanus* (sp. incert.), *Asilus*, *Eristalis tenax*, *E. arbustorum*, *Dasypogon* (sp. incert.), *Laphria* (sp. incert.), *Dexia* (sp. incert.), *Bombylius* (Acroceridæ).

Hemiptera. — *Lygæus militaris*, *Pyrrhocoris ægyptius*, *Hydrometes* (sp. ignot.), *Rhaphigaster griseus*, *Cydnus aterrimus*, *Pentatoma baccarum*.

Hymenoptera. — *Xylocopa violacea*, *Dielis aurea*, *Vespa germanica*, *Polistes gallicus*, *Apis mellifica*, *Andrena nigro-ænea*, *A. albicans*, *Andrena funebris* (only one in B. M.), *Andrena* (sp. incert.), *Panurgus* (sp. incert.), *Osmia cornuta*, *Anthophora nidulans*, *Eucera hispana*, *E. nigrilabris*, *E. trivittata*, *Camponotus herculeanus*, *Pompilus fuscus*, *Ammophila lutaria*.

Neuroptera.—*Libellula depressa*, *Æschna* (possibly *mauriciana*), *Lestes sponsa*, *Sialis lutarius*, *Chrysopa* (sp. incert.), *Ascalaphus ictericus*.

Langaron.

Coleoptera. — *Cetonia hirtella*, *Oxytherea stictica*, *Trichodes octopunctatus*, *Blaps gigas*, *Carabus bæticus*, *Asida solieri*, *Helops* (sp. incert.), *Geotrupes hypocrita*.

Lepidoptera-Rhopalocera. — *Papilio machaon*, *Pieris brassicæ*, *P. rapæ*, *P. daplidice*, *Colias edusa*, *Euchloë eupheno*, *Vanessa atalanta*, *V.*

urticæ, Satyrus megæra, S. mæra, Epinephile ianira, Chrysophanus phlœas, Polyommatus alexis, Melitæa phœbus, M. cinxia, Pyrgus sao.

Lepidoptera-Heterocera.—*Abrostola triplasia.*

Diptera.—*Anthrax* (sp. incert.), *Tipula* (sp. incert.).

Hemiptera.—*Lygæus militaris, Pyrrhocoris ægyptius.*

Homoptera.—*Triecphora sanguinolenta.*

Hymenoptera.—*Polistes gallicus, Xylocopa violacea, Melecta punctata, Osmia ænea, Polynerus* (sp. incert.), *Allantus* (sp. incert.), *A. dispar.*

Neuroptera.—*Libellula depressa, Limnephilus griseus ?.*

GIBRALTAR.

Coleoptera. — *Nacerdes melanura, Heliotaurus ruficollis, Cetonia squalida, C. hirtella.*

Lepidoptera-Heterocera.—*Zygæna* sp. —?

Hymenoptera. — *Anthidium* (sp. incert.), *Polistes gallicus, Odynerus quadratus, Apis mellifica.*

Diptera.—*Idia* sp. —?, *Syrphus balteatus.*

Hemiptera.—*Lygæus militaris.*

MALAGA.

Lepidoptera-Rhopalocera.—*Satyrus meone, Colias edusa.*

Diptera.—*Eristalis tenax.*

CONTRIBUTIONS TO THE CHEMISTRY OF INSECT COLOURS.

By F. H. Perry Coste, F.C.S., F.L.S.

(Concluded from p. 192.)

After this exceedingly brief reference to a few cases of variation that illustrate my argument, I will venture to indulge in a little prediction. We are often told that the power of prediction is the test of a theory's correctness, and I am bold enough to predict with considerable confidence that the following varieties will somewhere or at some time be found naturally occurring. Indeed, it is highly probable that many of them have long since been found and chronicled, but if so I am ignorant of the fact. It will be understood that these unknown varieties are predicted on the strength of the evidence now amassed as to the nature and constitution of the pigmental colours, and are in no sense, of course, intended to be exhaustive of the subject. I merely take typical species, and predict variations which one may expect to occur similarly in other species with similar colouring. I shall take as a guide the tabulation given last year,[*] and will notice first retrogressive varieties, taking the colours *seriatim*:—

Yellow and Orange.

E. cardamines (male).—Pale or colourless varieties.

G. rhamni.—Pale varieties; colourless less likely.

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[*] Entom. xxiii. 248—252.

G. cleopatra.—Varieties with no orange flush; possibly also white (*i. e.*, colourless) varieties.

Abraxas grossulariata.—Varieties with no yellow marks.

Chestnut.

V. io and *antiopa.*—Varieties with black upper surface.

V. urticæ.—"Sun-bleached" varieties; *i. e.*, the chocolate replaced by a colourless colour, as seen on the lower surface normally.

Argynnis, E. tithonus, C. pamphila, Hesperidæ, &c.—More or less whitish ("sun-bleached") varieties should be found of all these, but especially of *C. pamphila.*

*Red and Pink.**

V. atalanta.—Red replaced by *cardui*-brown.

P. apollo.—Yellow-spotted varieties.

Sphinges.—Pink replaced by yellow or almost white.

Catocala nupta, &c.—Yellow varieties.

And similarly yellow varieties of all species marked with "the normal red."

Green.

H. prasinana, Moma orion, D. aprilina, L. viridaria, G. vernaria, H. strigata, M. margaritaria, Tortrix viridana.—Yellowish or white varieties of these and all such green species (as well as of the green Papilios, such as *codrus,* &c.). Probably, however, in many of these green species such white varieties are frequent, owing to the *fading.*

Furthermore, among *physical* colours, I should expect the bronze-brown variety of such green species as *Argynnis, Ino,* and *Thecla rubi.*

In the next place, as to progressive varieties, we might get pale yellow or chestnut varieties of any white species; but there can be no sufficient reason for predicting such variation of any given species, unless either a nearly allied species is already so coloured, or unless the species in question is itself already slightly marked in this way: for instance, *A. grossulariata,* which normally possesses a row of yellow spots, has occurred as an entirely yellow variety. In exactly the same way we should never be surprised at a red variety of any yellow species, but we have no grounds for definitely predicting it in any given species unless allied species already possess red markings. Thus I should consider red varieties of *Arctia villica,* and of the normally orange *Catocalæ,* as pretty certain to turn up some day; and furthermore, on the strength of the cyanide experiments, I should anticipate red or red-marked varieties of the species of *Colias, Gonepteryx, Terias,* &c.

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* My contention that the retrogressive coloric varieties are due to general unhealthiness of the conditions received another confirmation by Mr. Mitchell's note in the July number of the 'Entomologist' (p. 171), where he chronicles the emergence of an *abnormally small and pale* specimen of *B. quercus* from a badly wounded pupa.

In accordance with what has been previously stated,* it appears not improbable also that green varieties of pale yellow species, and very occasionally red varieties of some chestnut species, may be found. It is scarcely necessary to point out that while there are definite data for predicting retrogressive varieties for any given coloured species (the genealogy of whose colour is known), there are no such reasons for predicting progressive variation, *i.e.*, an advance to a higher colour, which the history of other species shows to be possible, but cannot show to be inevitable. Enough has, however, now been said to show along what lines we should look for coloric varieties.

There now remains one further point only for discussion, *viz.*, the genetic relations of white, yellow, and red. I had originally supposed that it would be necessary to argue this at some length, in order to convert those who may have adopted Mr. Cockerell's views; but I think that by this time the amount of evidence that has been detailed, bearing more or less directly on this discussion, renders any lengthened argument at this stage superfluous.

Mr. Cockerell proposed—if I understand him—as a hypothetical explanation, that the primeval† colour was yellow, that from this was evolved white, and from (?) this again red. I think, however, that the evidence brought forward in these articles may be considered absolutely to demonstrate the incorrectness of this view, and to show that the order has been white, yellow, red. Both the experimental evidence and the entomological evidence (*i. e.*, of variation, &c.), are dead against Mr. Cockerell's view. Red and yellow are proved to be pigment colours, white is not: are we to suppose that originally there was a yellow (*i. e.*, pigmental) wing; that then, by an evolutionary advance, a white (*i. e.*, unpigmented) wing was produced; and then, finally, a red (*i. e.*, pigmented)? Again, on such a view it is incomprehensible that yellow varieties of red both occur naturally, and appear as the result of chemical reagents acting on red species; while white varieties are almost, if not quite, unknown in nature, and very rare in experiment, and then only as subsequent to yellow. Moreover, the one or two instances in which I have obtained white wings from red form the last link in the chain of evidence, and are absolutely convincing against such a view; for, as has been already stated,‡ if we take *Delias hierte* or *eucharis*, we have side by side red, yellow, and white: acids instantly turn the red to yellow, and then this yellow and the original yellow alike dissolve, leaving a pure white wing.§ Nothing could more plainly demonstrate that the genetic order of the colours is white, yellow, red. In fact, to suppose that white occurs between yellow and red is to lend ourselves to utter absurdities.

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* *Cf.* Entom. xxiv. pp. 118, 119, and 138, 139.
† I do not mean of *all* species, of course.
‡ Entom. xxiv. 13.
§ *Cf.*, too, *G. cleopatra.*

Furthermore, I have shown how closely allied are yellow and chestnut: if, therefore, we suppose yellow anterior to white, equally so must we place chestnut: and then we should be flying in the face of all entomological evidence. We should have to consider all the "sun-bleached" or milk-white varieties of the chestnut species as progressive varieties to the higher stage of white! I do not think that any one who has ever compared a natural or artificial "bleached" variety with the richly coloured normal insect will give this contention a second thought. Furthermore, we should be logically bound to consider the pale (*i. e.*, white) female of *G. rhamni* as a progressive advance on the deep yellow of the male, and the white variety *helice* of *Colias edusa* as an advance on the conspicuous orange of the type; but this is simply to meet the certain fate of being crushed by the whole weight of biological evidence that shows the general advance from pale to bright and conspicuous colours;* indeed, it scarcely seems worth while to follow this question further. I may refer, however, to a passage in Wallace's 'Tropical Nature' (pp. 204, 205), in which he describes how in *Pieris pyrrha*, *molenka* and *lorena*, the males are plain white and black, whilst the females are orange, yellow, and black, and so banded and spotted as to exactly mimic certain Heliconidæ; the gist of the whole passage being that (in this case) the females have acquired these yellow colours, whilst the males preserve their *old markings*: what is this but advance from white to yellow? Moreover, Mr. Cockerell's own remarks on *Euchloë cardamines* are a condemnation of himself; for, in a paper read before the South London Entomological Society, he proposes† the view that this genus has arisen in comparatively recent times as an "offshoot from an old *Pieris* stock," *i. e.*, therefore that the orange and yellow colours of this genus are derivative, and the white primeval; not *vice versâ*. But it is possible that Mr. Cockerell may repudiate some of the arguments‡ that I have been combating here: it is possible that he might conceive yellow to be the original colour from which, on the one hand, red has been evolved by an alteration of the pigment, and, on the other hand, white by a destruction thereof. This would avoid the absurdity of interpolating white between yellow and red, but it is open to the following objections: that there is no evidence in its favour, that it is in opposition to the arguments just advanced in favour of the evolution of yellow and chestnut from white, and that it is not easily reconciled with the existence of such species as *Delias*. But, indeed, I am vain enough to think that Mr. Cockerell, who, after all, only advanced his hypothesis doubtfully—provisionally (as he himself remarked in a note to me)—has long since been convinced by my arguments and experiments.

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* Except, of course, in cases where concealment is necessary.

† Entom. xxii. 143.

‡ Since writing the foregoing I have turned up a note made some time since, with a reference to the 'Entomologist' (xxi. 113). There I see that Mr. Cockerell apparently *does* propose to so derive red from yellow, as well as white from yellow; but I do not gather so much that he proposes the scheme referred to in the text (*i. e.*, the same yellow giving rise to both white and red), but rather looks upon red as derived from one yellow, white from another. Of course, when his remarks were written there was practically no experimental evidence at hand on this subject. The only single support I have met with for Mr. Cockerell's views on the derivation of white from yellow, is a remark by Kirby ('European Butterflies and Moths,' p. 8), that *Bryonia* appears to have been the early form of *Pieris*, and was yellow.

And here, then, I must take leave of my readers, whose patience, I trust, has not been overtaxed by a series of articles running through seventeen months. I doubt not that many corrections and modifications will need to be made at all points in the theories to which I have been led by my experiments; but it will be a sufficient satisfaction to me if I shall have succeeded in laying fairly secure foundations where previously building—otherwise than by airy hypothesis—was chiefly conspicuous by its absence. I hope to continue my work as opportunity permits, and especially to investigate the colour of larvæ, for which work, however, I have at present no material. But if others who have the opportunity will investigate the colours of other orders, such as Coleoptera and the like, I shall be interested to know what bearing, confirmatory or otherwise, their work may have on my theories.

Errata.—Page 166, line 17, for "there is reason," read "there is no reason"; p. 167, line 15 from bottom, for "*nireus*" read "*niveus*"; p. 168, bottom line, for "efficacy of the first to cause," read "efficacy of this factor in causing"; p. 189, line 8 from top, for "and of what," read "and examples of what," &c.; p. 190, line 16 from top, for "e. g. *Delias*," read "e. g. in *Delias*."

ABUNDANCE OF LEPIDOPTERA IN NEW ZEALAND.

By W. W. Smith.

Mr. R. Adkin's additional observations "On the occasional abundance of certain species of Lepidoptera" (Entom. xxiv. 60), together with the same gentleman's appreciative and suggestive comments on a kindred paper of my own (Entom. xxiii. 305), has induced me to contribute some further notes on the subject. When I referred to Mr. Adkin's original and interesting paper (Entom. xxiii. 177) dealing with the "sporadic abundance" of certain species in the British Islands, I was fully aware that he sought to explain, or suggest, the probable causes *only* of the sporadic occurrence of such species, and not to deal with the subject on general principles as applicable to all species in seasons when most Lepidoptera were unusually numerous. The gist of my own paper more especially dealt with the subject on broad principles, and I explained one cause which unquestionably produced the great abundance of many species of Lepidoptera last season in New Zealand. In his original paper Mr. Adkin enumerates over a dozen species which appear sporadically in the British Islands, and after discussing the evidence of such, concludes, "however incomplete it may be, tends to the conclusion that immigration is a chief factor in the causes of great abundance occasionally observed, and in some instances the direct and only cause." Referring to my remark that immigration could have no bearing on the question in New Zealand, Mr. Adkin says, "I cannot admit that this greater distance would form an insurmountable obstacle to immigration; if it were so, it seems highly improbable that that essentially New World species, *Anosia plexippus*, would have reached Great Britain; and except for this greater sea space, the relative position of the British Islands and New Zealand to their respective Continental bases are singularly alike," and adds, "That migrations of Lepidoptera from the Continental portion of the European area to the British Islands do occur has already been shown, and is it not reasonable to suppose that a similar condition of things exists in regard to New Zealand?" Let us briefly consider these remarks. The dispersion of *Anosia plexippus* in late years over the greater part of the known world presents an interesting problem, which, when perfectly solved, should explain many of the apparent anomalies in the geographical distribution of Lepidoptera. I am not well versed in the literature of the subject, at least so far as it deals with the modes of dispersion of this species. But its occurrence at the Antipodes is even more remarkable than in the British Islands. It was first captured in New Zealand by Mr. F. W. Sturm, up the Wairoa River, Hawkes Bay, North Island, in December, 1840, and subsequently on the Rangitikei River, on the western side of the Island. It was also obtained in Westland, South Island, by Sir James Hector, nearly thirty years ago; and I observed it on the Rangitata River, on the eastern side of the Island, thirteen years ago. But I have not heard of a single capture for many years past. I will here refer to other species formerly inhabiting New Zealand, but now extinct, as I desire to adduce evidence to show that these species were probably ancient inhabitants of the Islands, and not in all cases mere modern accidental introductions by man. A male of *Catopsilia catilla* was taken many years ago in the grounds of St. John's College, Auckland, and is now preserved in the local museum. Several specimens of the beautiful *Diadema nerina* were captured forty years ago, and sent at that time to the British Museum by the late Dr. Sinclair, of Auckland, and others taken and observed by the late Rev. Richard Taylor, of Wanganni, and Dr. Barker, of

Christchurch, New Zealand. Other species occurring in Australia and New Zealand are *Pyrameis stea*, *P. cardui* var. *kershawi*, *Lycæna phœbe* (one specimen only taken), and *Junonia vellida*. Among the Heterocera having a wide distribution occur *Heliothis armigera*, *Agrotis ypsilon*, *Sphinx convolvuli*, *Deiopia pulchella*, &c. The above list is given to show the geopraphical range and relations of the species, and it appears to me that the question of their distribution must be explained by some more reliable theory than their occasional immigration from Australia, or accidental introduction by other means. For this purpose let us consider the geological aspect of the case.

The Lepidopterous fauna of New Zealand is, with few exceptions, composed of very ancient species, and Mr. Meyrick, who has traced the affinities of the Micro-lepidoptera with a skilful hand, has shown that a few of the same genera, or other closely allied genera and species, are also found in different parts of Australia, Tasmania, Fiji, Europe, Ceylon, Borneo, Hawaiian Islands, and South America. In his Presidential Address to the Philosophical Society of Canterbury, New Zealand, in 1884, Prof. F. W. Hutton pointed out that "New Zealand had not been connected with Australia since the cretaceous period." The same able geologist, in dealing with the origin of our fauna and flora, also pointed out that in early mesozoic times New Zealand, Eastern Australia, and India formed one biological region, land probably extending continuously from New Zealand to New South Wales and Tasmania. Referring to the scarcity of animals occurring in both Australia and New Zealand, Prof. Hutton remarks, "On the whole we may well be astonished that, notwithstanding the strong westerly cyclones and the special facilities afforded by petrels, no animals except a few birds and insects, and but few flowering plants, have been able to cross this very ancient barrier." Mr. A. R. Wallace, in discussing the origin of the New Zealand fauna, admits that there is "a wonderful amount of speciality," and adds that "the affinities, where they can be traced, are with Australia and Polynesia." But the labours of Mr. Meyrick with the Micro-lepidoptera, and Mr. A. G. Butler in other groups, have clearly shown that with few exceptions the Lepidopterous fauna of New Zealand has originated within its present limits or region, and are unquestionably relects of a very ancient fauna. In the case of the species mentioned as occurring in both countries, they appear to me to afford examples of species retaining their typical colours for an almost indefinite period of time. The same applies to several species of Coleoptera, and birds of feeble flight indigenous to both countries; but we need not here impress the bearing of this question further on the subject.

In regard to the occurrence of the Eastern golden plover in New Zealand, and the latter forming its eastern limit, it seems to me to afford no support to Mr. Adkin's theory of occasional migratory swarms of insects probably following the annual migration of birds. Although the great geographical range of this bird was recently referred to by Colonel Legge, its annual migration was known to the late Mr. Gould nearly half a century ago, and a very complete history of the species is given in Sharpe and Dresser's 'Birds of Europe.' Sir Walter Buller, the greatest authority on the birds of New Zealand, remarks, "It occurs occasionally on the New Zealand coast, but apparently only as a straggler, and almost always in winter plumage." If such a theory were tenable, it would be more supported by the annual migration to New Zealand of two species of cuckoos, the one from Australia, the other from Polynesia. And other species occur as stragglers, generally at long intervals, but all are endowed with great powers of flight, and no doubt the migratory impulse in birds has been inherited for innumerable ages. The annual migration of birds to the British Islands, and the occasional migration of swarms (or the greater abundance) of certain species of Lepidoptera from the Continent, seem to me to be due in many cases to totally different causes; with birds it is an heriditary impulse acting in obedience to the law of reproduction; with Lepidoptera it may, as Mr. Adkin observes, sometimes affect the status of a species, at least such with wingless females; yet in New Zealand I observe that the occasional abundance of Lepidoptera is due to the law of interdependance of plants and insects operating with greater force in some seasons than others. The imagos of some species of Lepidoptera are dependant on the blossoms of certain plants for their support, the failure of which in some districts (or a scarcity in some seasons of the food-plants of the larvæ) would instinctively impel them to migrate to other districts where such existed, thus causing their numbers to be concentrated within a limited area. The same cause affects frugivorous birds, and in the agricultural districts we have experienced four great irruptions of the native parrakeets within the last twenty years from this cause alone.* In the forest region of Westland some seasons are noted for producing great swarms of insects. In such seasons the insectivorous birds invariably appear in greater numbers in the districts most affected, and roam through the forest in large flights, consuming them. The species of birds that congregate in these districts in certain seasons are generally met with singly, or in pairs; and we have here analogous cases of birds and insects illustrating the law of interdependance of plants and insects, and of birds and insects, together with an elucidation of the causes of the partial or perfect migration of certain species of both forms. In the case of the several species named by Mr. Adkin, with wingless females and their swarms occurring at intervals of several years, it is probable that such are regulated by the same cause: but of British Lepidoptera I do not profess to know anything; there are probably other causes regulating the migratory instinct of which we know little or nothing; yet, this line of research, when carefully pursued, affords a method of working out the causes which regulate the numbers and distribution of certain species. If we consider the great distance between Australia and New Zealand (given in the 'Challenger' expedition at 1200 miles), I doubt if any species occurring in New Zealand could sustain such a flight across the intervening ocean. If *Anosia plexippus* is not an old indigenous inhabitant of New Zealand, it could only have reached the Islands from the east, and in such case the difficulties would be much greater, and certainly I know of no artificial means favouring its dispersion before the year 1840, as very few European settlers had settled in the Islands before that date. If migration from Australia could have any bearing on the occasional abundance of Lepidoptera in New Zealand, we would naturally expect the occurrence also of other strictly Australian species, many of which are powerful fliers, but such has never been observed here; and although I do not fully agree with Mr. Adkin's concluding remarks, I believe I have made it clear that the general abundance of Lepidoptera and other Orders of insects observed last season in New Zealand was not in any way affected by migration, but the effect only of strictly local causes operating under very favourable conditions.

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* The irruptions of Pallas's sand grouse into the British Islands in 1863, and two years ago, is another case in point. If "the occasional migrations of Lepidoptera follow the routes taken by the birds in their annual movements," it would be of considerable interest to know what caused the dearth of insect food, in the preceding year, which compelled the birds to migrate westward. There is a note in last year's volume of the 'Entomologist' (now lent to a friend, and I cannot cite it), calling attention to the occurrence in the British Islands of *Deiliphila galii* in unusual numbers in both years in which the birds appeared. Although even in these exceptional cases such occurred, it was in all probability due in both instances to the absence of food in their natural haunts, caused by some seasonal derangement.

Ashburton, New Zealand, June 20, 1891.

ENTOMOLOGICAL NOTES, CAPTURES, &c.

Entomological Pins. — The black-enamelled pin introduced a few years ago, and now so generally adopted, is undoubtedly an advance on the silvered pin previously in use, but our entomological pins are still open to considerable improvement; they should be firmer, and furnished with sharper points. We do not now find so much verdigris in collections of Lepidoptera where black pins are wholly used, and in the few cases where verdigris exhibits itself, the cause is probably due to the fact that the pins with which the affected insects are impaled had a portion of the enamel abraded when they were inserted in the specimens. Users of black pins, the smaller sizes especially, often find that two, or sometimes more, are stuck together.

These should be thrown away at once, as to use them for cabinet specimens of Lepidoptera would almost certainly result in the subsequent distortion of the insects. In pulling apart these "geminated" pins, the enamel would be stripped from one or the other, perhaps both; at the point or points of cohesion, and, as the pins are made of brass, corrosion would be sure to ensue when the abraded portions came in contact with moisture of any kind. Whilst makers continue to fashion our pins of brass they will never succeed in giving entomologists a thoroughly satisfactory pin, *i.e.*, one which is practically incorrodible, will not collapse under moderate pressure, and bearing withal a point capable not only of piercing the thorax of an insect, but of penetrating any substance not harder than deal. Mr. Leech has had a pin made for him in continental sizes (supplied by Watkins and Doncaster) which possesses all these desirable qualities, and there appears to be no valid reason why the same makers should not turn out as good a pin in English sizes.—Richard South.

Gynandromorphous Argynnis paphia.—While collecting in the New Forest I captured a very curious variety of *Argynnis paphia*, the wings on the right hand being decided female, while those on the left are decided male, giving the insect a very peculiar appearance.—C. H. Williams; 7, Carburton Street, Great Portland Street, W., August 19, 1891.

Gynandromorphous Colias electra.—Recently I received a small collection of Rhopalocera from the Transvaal, and amongst them there is a singular aberration of *C. electra*. The right side is male, and the left is female; and while the male wings are normal in colour, the female side differs altogether from the type, in being the pale, almost white, variety that corresponds to our var. *helice* of *C. edusa*.—Robert Service; Maxwelltown, Dumfries, August 18, 1891.

Variety of Vanessa c-album.—On the 25th of July last I captured, on the banks of the Wye, near here, a curious variety of *V. c-album*. The specimen is smaller than is usual. Colouring very dark. The right fore wing has the two large spots on the costal margin coalesced, also the two on the inner margin; all much suffused. The left fore wing has the spots distinct, but large and suffused. The hind wings are suffused with deep black at the base, and without distinct spots. I may add that the species is fairly plentiful here this year.—(Rev.) Gerard W. Palmer; The Vicarage, Monmouth. [Our correspondent has very kindly sent us a coloured sketch of this interesting aberration. It appears to be a modification of the form figured, Entom. xxii. pl. viii. fig. 5.—Ed.]

Xanthic Variety of Epinephele ianira.—I captured in the New Forest, 21st July last, a beautiful partially bleached (xanthic) form of *E. ianira*, having the right primary of a glistening creamy white blending into pale smoky brown at the base; the ocellus is normal, excepting the black pupil, which is not so deep in colour. It is a male, in the very finest condition; apparently it had not flown before I secured it, as its flight was slow and weak. "Bleached" is hardly a correct term for this particular form of variation, as it is caused by the want of colouring pigment in the scales, which, I should say, is not bleaching. The term *xanthic* or *xanthine*, therefore, would be more appropriate for this constant phase of variation in the Satyridæ.—F. W. Frohawk; Balham, S.W., August, 1891.

Note on the Emergence of Notodonta trepida.—Last autumn Mr. Christy, of Watergate, was good enough to send me twenty pupæ of *N. trepida*, and imagines from these have emerged this year in, as it appears to me, a most erratic manner. The first specimen, a female, appeared on May 13th, and was followed by a male on the 20th of the same month. After an interval of twenty-four days, another male came up on the 13th of June. Two males emerged on the 21st of June, and two males and one female on the 23rd closed the list for that month. On July 11th two males appeared, and a female on the 19th. The first female was kept alive for twelve days, but was removed from the breeding-cage on the ninth day, as it was noticed she had commenced laying eggs. When placed in a chip-box, covered with muslin, she deposited a number of ova, but these, together with those previously laid in the breeding-cage, were infertile. The female and two males, which emerged on June 23rd, were allowed to remain in the cage for sixty hours, when the female was placed in a chip-box, wherein she deposited ninety-three eggs; but these, also, proved to be infertile.—Richard South.

Notes on Asthena luteata.—This is a species I have met with sparingly among maple in many places during the last twenty years. Beating hedges and netting at dusk have been the chief methods of procuring it. This season I discovered that it flies high in the air, some eight feet from the ground, at about half-past eight p.m. Availing myself of this discovery, I succeeded in catching with a long-handled net, on June 24th, no less than twenty-one specimens of *luteata* between half-past eight and nine p.m. One of the females I sleeved out on a maple-bush in my garden, and, on bringing it indoors for examination early in August, I found it contained several larvæ of *luteata*. They are apple-green, showing white between the segments, and are covered with numerous fine hairs. This larva was quite unknown to me before, and I think the majority of entomologists are unacquainted with it. The great advantage of breeding from the egg is that it enables one pretty accurately to hit the time for finding the larva in a state of nature. August is rather a dull time for collecting; so, having nothing better to do, I sallied forth with my umbrella on the afternoon of the 15th, and, as a result of about an hour's beating, I obtained some twenty *luteata* larvæ. They were of all sizes, a few full-fed, but mostly quite small, and very difficult to see in the umbrella. They hang by a silk thread, and are very lively little fellows. I found it paid better to beat separate bushes, rather than the maple forming part of thick compact hedges. The larva pupates in a cocoon formed of silk, and covered on the outside with particles of sand. It remains in the chrysalis state during the winter.—(Rev.) Gilbert H. Raynor; Victoria House, Brentwood, August 15, 1891.

Asthena blomeri in Buckinghamshire.—On the 8th of August last I took two specimens of this pretty species in a beech wood about six miles from Rickmansworth. They were resting on the trunks of beech trees, and are in good condition.—Richard South.

Early Pupation of Smerinthus populi.—When pupa-digging on the 4th of August I took a larva of *S. populi*, which became a pupa on the 9th, this being two months earlier than I have ever taken it before.—D. H. S. Stewart; Red Court, Bedford, August 11, 1891.

Collecting in Cambridgeshire and Suffolk.—When I went down to Wicken, on June 3rd, the Fen was still looking brown, and the dead reeds and sedge still overtopped the young growth, and gave the place quite a winterly aspect. Some early moths were still already about, and I took a good many the first night. The weather, for the greater part of the next fortnight, was cold, cold enough for fires and winter clothes. At light, in the Fen, I had but two decent nights, the first and the last, June 3rd and 17th. On June 3rd the night was darkish and fairly warm, but the wind was in the east. The following moths were taken:—*Saturnia carpini*, 1, a female, quite fresh: *Spilosoma fuliginosa*, commonly; *S. menthastri*, 2 or 3; *Meliana flammea*, several (this species must be taken when it first comes out, as it gets shabby very quickly); *Tæniocampa gracilis*, a female, which I saved for eggs (it layed on dwarf willow in a muslin sleeve; the larvæ are now feeding, and seem to me very small, some of them being scarcely ¾ of an inch in length, August 4th); also *Coremia ferrugata*, *C. unidentata*, *Cidaria associata*, *Eupithecia vulgata*, and *Nascia cilialis*, 2, June 17th; *S. fuliginosa*, 2 or 3; *S. menthastri* and *Earias chlorana*, 1; *M. flammea*, several (mostly worn specimens); *Arsilonche venosa*, 2; *Grammesia trilinea*, *Eupithecia centaureata*, *Cabera pusaria*, *N. cilialis*, several. Sugar was moderately successful on more than one occasion, and produced:—*Noctua rubi*, common and worn; *Gonoptera libatrix*, a few; *Apamea basilinea*, several; *Hadena adusta*, several; *H. genistæ*, 2 or 3; *H. oleracea*, 2 or 3; *H. suasa*, 1; *Dianthœcia cucubali*, 1; *Tæniocampa gracilis*, 2; *T. gothica*, 2; *Acronycta psi*, 2 or 3; *A. megacephala*, 1; *Apamea unanimis*, common. Of larvæ and pupæ I got the following:—*Lasiocampa quercifolia*, a few found on buckthorn bushes (this larva was to be found up till June 16th, and perhaps later for all I know); *Scotosia vetulata*, on buckthorn; *Plusia festucæ*, 2 or 3; *Leucania pudorina*, *L. impura*, and *Triphæna interjecta*, 2 or 3 by sweeping. Heavy dew or rain made sweeping very unpleasant and unproductive, and many of the larvæ were killed in the bag by the weight of the wet calico and the mass of snails that were collected at every sweep. Of *Plusia orichalcea* larvæ I took a few on hemp agrimony, on June 5th. *Callimorpha dominula* larva, 1: this now scarce moth is said to have been very common here many years ago. *Lithosia complana* larvæ, feeding on the lichens on the bark of willow trees; the imagines, which have been lately coming out, nearly all have the under wings pale lead-coloured, not yellow, but the same colour as the fore wings, only much paler. *Geometra papilionaria* larva, 1, on alder. Pupæ of *Trochilium apiformis*, 3, and *S. populi*, 1, by digging at the roots of poplars. *Papilio machaon* was flying when there was enough sun, which was seldom. *Hepialus lupulinus* was common, and I took some very pale-coloured males, almost cream-coloured [see Entom. 197]. *Hydrelia unca* and *Bankia argentula* were also on the wing. From June 18th to 22nd I was at Tuddenham, and the weather was very hot and sunny all the time. *Lithostege griseata* was on the wing, but most of the specimens were worn. *Acidalia rubricata* was very scarce, and I did a great deal of walking and beating of rough grass for it and *Agrophila sulphuralis*. The last-named species was just beginning to come out, and all that I took, some dozen specimens, were in good condition. *A. rubricata* is an extraordinarily sharp flyer for so small a Geometer; it seems to dart off, when disturbed, as quickly as a skipper, and a blazing sun and high wind I found were all against catching them. Sugar was very good. Moths came well on four nights out of five. I took the following:—

G. trilinea, common; *Miana strigilis*, common; *M. fasciuncula*, several; *Rusina tenebrosa*, several; *Agrotis segetum*, several; *A. exclamationis*, 2; *Noctua plecta*, 2 or 3; *L. comma*, 2; *Dipterygia pinastri*, several; *Mamestra anceps*, several; *M. brassicæ*, 1; *M. albicolon*, 3 or 4; *Apamea basilinea*, 3 or 4; *Caradrina morpheus*, common; *Triphæna pronuba*, 3 or 4; *T. subsequa*, several; *Axylia putris*, 2; *Xylophasia rurea*, 3; *X. polyodon*, 1 or 2; *Apamea gemina*, several; *Noctua c-nigrum*, 3 or 4; *Neuria saponaria*, 1; *Hadena genistæ*, 1; one *Chærocampa porcellus*, at rest on a nettle, about 10.45 p.m.; and one *S. tiliæ*.—W. M. CHRISTY; Watergate, Hants.

COLLECTING IN SOUTH WALES.—I came down into South Wales on the third week in June, and for some days found the weather most favourable for Lepidoptera. Of the Diurni, in June, *Argynnis selene*, *Lycæna icarus*, and *Hesperia sylvanus* were plentiful; so late as June 23rd *Euchloë cardamines* was on the wing; and at the same date *Argynnis aglaia* was just emerging. On favourable evenings, damp and windy ones I generally find the best, the commoner species of Lepidoptera came plentifully to sugar, such as *Agrotis exclamationis*, *Noctua festiva*, *Miana strigilis* var. *latruncula*, *Apamea gemina*, *A. unanimis*, *Xylophasia monoglypha* (*polyodon*), *X. lithoxylea*, *X. rurea*, and others. On the 27th, *Phlogophora meticulosa* appeared with *Leucania impura*, *L. pallens*, and *Axylia putris;* and *Noctua rubi* was still out. *Thyatira batis* was still on the wing on July 6th, *T. derasa* on the 11th (would not this be too early for the second brood?). The whole month of July was a complete change to that of June as regards sugaring, on several evenings scarcely a single specimen appearing. In Pembrokeshire, on July 17th, near the sea-coast I saw *Thecla rubi*, *Vanessa urticæ*, one specimen of *V. atalanta*, *Argynnis paphia*, and *Bombyx quercus* dashing about in its usual headlong flight. At the present time both *Pieris rapæ* and *P. napi* are very abundant, in some places quite in swarms. I think the scarcity of Lepidoptera at sugar during July may have been due to the quantity of natural food at that time, as the blossom of grasses, rush, &c.; but certainly many evenings were not favourable. I might add that the Geometræ, generally, have been common. —T. B. JEFFERYS; Carmarthenshire.

COLLECTING IN NORTH WALES.—I spent the month of July at Penmaenmawr (on the north coast of Wales), and though, as a whole, the district does not seem to be very productive in Lepidoptera, the quality amply makes up for this deficiency. My wanderings led me one day up among the crags on the mountain tops, and here I found *Agrotis lucernea*, flying over a patch of shale in great numbers. They were bad to get, owing to their rapid flight and the loose foothold; but I managed to get upwards of twenty beautiful specimens in a few days. When I had had enough of *lucernea*, I took to searching the cliffs for any unwary moth that might be there, and to my great delight discovered, first *Agrotis ashworthii*, and then *Acidalia contiguaria*. Of the former I took eight in fine condition, and two more not so good; and of the latter I took eight also, all in very fair order. I was the more pleased at getting these two things as I did not know at the time that they were to be got in the neighbourhood. There were sundry other things sitting about on the rocks, viz., *Bryophila perla*, *Gnophos obscurata*, *Larentia cæsiata*, *Anaitis plagiata*, &c.; but after *ashworthii* and *contiguaria* these did not come in for much attention. I also took several batches of Noctuæ ova, the larvæ from which are now feeding well willow. From what descriptions I can obtain of the young larvæ, I shou say they are *ashworthii*, but cannot make sure yet. — L. S. Brad Mowbray Villas, Sunderland, August, 1891.

Notes from the New Forest.—On July 20th I went down to Lyndhurst, accompanied by a college friend, Mr. E. B. Charles. The night of our arrival was too wet for outdoor work, but we made a beginning by taking a fine specimen of *Geometra vernaria*, which flew into the billiard-room of the "Crown Hotel." The next day was fine, but dull, and a stiff breeze was blowing. We got to work early in the neighbourhood of Hurst Hill. *Epinephele hyperanthes* and *E. ianira* were the first insects to put in an appearance, the latter showing occasional bleached forms. *Pararge ægeria* and *Epinephele tithonus*, though less common, were also seen, as well as a few worn *Argynnis selene*. As usual, *A. paphia* was present in myriads. On the heaths we met with very fine *Eubolia palumbaria*, *Pseudoterpna cytisaria*, and *Lycæna ægon*. *Argynnis adippe* was also in evidence, but was by no means common; and a few *Hesperia sylvanus* turned up. We got a pretty form of *Boarmia repandata*; and, towards noon, a noble specimen of *B. roboraria* fell to my companion. One *Limenitis sibylla* was seen, but managed to make good its escape. After luncheon we turned back to Lyndhurst, and, armed with a fresh supply of pins and boxes, made our way across the heath to the railway station. In an enclosure, close to the line, we found *Melanargia galatea* literally swarming; and also took *Pyrausta purpuralis*, *Phytometra ænea*, *Argynnis adippe*, *Ellopia fasciaria*, and a solitary *Zygæna trifolii*. In the evening we tried sugaring in Hollands Wood. This expedition had no result, entomologically speaking; but the dull futility of our visits to the trees was presently relieved by an incident which, while it furnished a little extraneous excitement, very nearly ended our career as collectors, and brought our operations for that night to an untimely end. Our lamp blew up, and, after a gorgeous pyrotechnic display, left us helpless in the dark. There was nothing for it but to abandon the sugar and return to our hotel, which we accordingly did. The weather on July 22nd was again dull and windy, with the addition of a few heavy showers at mid-day. We took, however, *Limenitis sibylla*, and one each of *Gonopteryx rhamni*, *Gnophos obscurata*, *Calligenia miniata*, and *Selidosema plumaria*. Some very fine *Satyrus semele* and *Hesperia thaumas* were also captured. Our evening's sugaring, undertaken for the benefit of *Catocala promissa*, was a dead failure; and the same may be said of a gigantic lighthouse which we erected in Hurst Hill Enclosure. However, at dusk we netted *Pseudoterpna cytisaria* and *Hemithea thymiaria*. On the 23rd we took a new direction, and started early for Brockenhurst through the woods. As we worked our way along we took *Limenitis sibylla* by the score, but only the females were in good condition. The sun was hidden nearly all day behind a thick bank of clouds, but, notwithstanding, *Argynnis paphia* was to be seen in hundreds resting motionless on the bracken and brambles. An occasional *valesina* appeared, and we took three, of which two were very fine. *Eubolia mensuraria*, *Pyrausta purpuralis*, *Hesperia thaumas*, and *H. sylvanus* were very abundant. On reaching Brockenhurst we took train for Lyndhurst Road, and half an hour later were again enjoying good sport among *Melanargia galatea*, *Phytometra ænea*, and *Limenitis sibylla*. We also saw *Thecla quercus* and *Lomaspilis marginata*. The sugar and lighthouse in the evening fully maintained their reputation for futility, but we netted *Calligenia miniata* and *Lithosia mesomella*. On the next day (our last in the Forest) we had excellent sport on the same ground, taking many *valezina*, of which, however, several were torn and worthless; five grand specimens (four taken by Mr. Charles) represented our morning's work with this insect. In the afternoon we worked Lyndhurst Common for *Selidosema plumaria* and *Gnophos obscurata*. The latter failed to turn up; but *plumaria*, though not common, was in splendid condition. The same remark applies to *Satyrus semele* and *Pseudoterpna cytisaria*. We also took *Bupalus piniaria* (which, somewhat to my astonishment, was also in fine condition) and one more *Calligenia miniata*. We left next morning. Had the weather been a little more favourable, we should, no doubt, have added largely to our bag, as insects, though late, were plentiful and in good variety.—E. G. ALDERSON; Worksop, Notts.

LATE APPEARANCE OF AGROTIS ASHWORTHII.—My own general experience, in common with that of correspondents, shows the lateness of the season. Taking *Agrotis ashworthii*, for example, I find my first bred specimen in 1889 emerged on June 27th, in 1890 on June 23rd, and this year (1891) on July 12th—all bred on the same spot. An attempt this season to obtain eggs met with a fair amount of success. I fed the moths on fresh blossoms of the lime tree.—J. ARKLE; July 18, 1891.

LITHOSIA QUADRA AT KING'S CROSS.—On July 20th I had the pleasure of taking a fine female of *L. quadra*, at rest, in the York Road, King's Cross, N.W.—S. ROBINSON; Winchmore Hill, N., August 24, 1891. [Probably this and the specimen recorded *ante*, p. 196, were escapes.—ED.]

NOLA CENTONALIS, &C., IN THE HASTINGS DISTRICT.—On July 15th I took a fine specimen of *N. centonalis**, flying at dusk on the cliffs near the town; and at the same locality I have taken *Sesia ichneumoniformis** (1), *Acidalia osseata* (common), *Stenia punctalis*, *Platytes cerussellus*, *Homœosoma sinuella*, *Conchylis francillana*,* *Platyptilia gonodactyla* (all somewhat common), *Ceratophora rufescens*, &c. Those I have marked with an asterisk are new to our district.—A. FORD; Claremont House, Upper Tower Road, St. Leonards-on-Sea.

PLUSIA BRACTEA IN WORCESTERSHIRE.—Collecting near Bewdley, with my friends Messrs. E. and H. Tye, of Birmingham, on the 26th July last, I took a fine freshly-emerged specimen of *Plusia bractea*. It was flying among the herbage on a railway-bank, and, on settling, was easily captured.—GEORGE W. WYNN; 192, Lozell's Road, Handsworth, Birmingham, July 28, 1891.

A DAY AT TUDDENHAM IN SUFFOLK.—I went over to Tuddenham from Bury St. Edmunds, on the 13th of August last, to look for larvæ of *Dianthœcia irregularis*, but was disappointed to find that all the *Silene* capsules had been cleared off. There were several *Epinephele tithonus* flying about; and beating the hedgerows disturbed sundry specimens of *Acidalia bisetata*, *Coremia ferrugata*, *C. unidentaria*, and *C. quadrifasciaria*. A few of each were good enough to box. Altogether the excursion was not an entomological success.—RICHARD SOUTH.

CHŒROCAMPA NERII IN BRITAIN.—The following record should be added to the list given, *ante* p. 195. 'Entomologist,' xvii. 273, one imago, Blandford, Dorset, 1884.—R. S.

Captures at Electric Light.—Acting on the advice given by the Editor in Entom. 172, *re* the working of electric light, I paid a visit to the lighthouse now open at Chelsea, on the 15th of July, where I managed to capture specimens of the following; they were mostly rather battered:—*Leucania conigera, L. lithargyria, L. impura, L. pallens, Hadena oleracea, H. dentina, H. chenopodii, Agrotis corticea A. nigricans, Xylophasia polyodon, X. rurea, Cucullia umbratica, Phlogophora meticulosa, Tryphæna subsequa, T. orbona, T. pronuba, Cossus ligniperda, Zeuzera æsculi*, and *Chelonia caia*. Had the night been warmer and less windy the list might have been much larger, as on many nights moths have been very abundant, so the director of the light told me.—D. H. S. Stewart; Royal College of Science, Kensington, W., July 27, 1891.

A New Setting-board.—Messrs. Day and Newstead have recently introduced a new style of setting-board, which should prove most useful to those who experience difficulty in setting insects to their satisfaction on the ordinary board. By an ingenious arrangement of hinged flaps or slips of glass, the operator can, by means of this improved "set," manipulate his insects expeditiously and with precision.—Richard South.

SOCIETIES.

Entomological Society of London. — *August 5th*, 1891. — Mr. Frederick Du Cane Godman, M.A., F.R.S., President, in the chair. Mr. Arthur J. Chitty, of 33, Queen's Gate Gardens, S.W., and Captain E. G. Watson, of 5, Lypiatt Terrace, Cheltenham, were elected Fellows of the Society. The President announced the death of Mr. Ferdinand Grut, the Hon. Librarian of the Society, and commented on the valuable services which the deceased gentleman had rendered the Society for many years past. Dr. D. Sharp exhibited *Japyx solifugus*, from the Eastern Pyrenees, and stated that in his opinion it was a connecting link between the *Thysanura* and *Dermaptera*. He also exhibited pupæ of *Dytiscus marginalis*; one of these was perfectly developed, with the exception that it retained the larval head: this was owing to the larva having received a sight injury to the head. Dr. Sharp also exhibited specimens of *Ophonus puncticollis* and allied species, and said that Thomson's characters of the three Swedish species, *O. puncticollis, O. brevicollis*, and *O. rectangulus*, applied well to our British examples, and separated them in a satisfactory manner. Thomson's nomenclature, however, would, he thought, prove untenable, as the distinguished Swede described our common *puncticollis* as a new species, under the name of *rectangulus*. Mr. F. W. Frohawk exhibited a bleached specimen of *Epinephele ianira*, having the right fore wing of a creamy white, blending into pale smoky brown at the base; also a long and varied series of *Epinephele hyperanthus*, from the New Forest and Dorking. The specimens from the former locality were considerably darker and more strongly marked than those from the chalk. Amongst the specimens was a variety of the female, with large lanceolate markings on the under side, taken in the New Forest in July, 1890, and a female from Dorking, with large, clearly defined white-pupilled spots on the upper side. Mr. Frohawk further exhibited drawings of varieties of the pupæ of *E. hyperanthus*, and also a large specimen of a variety of the female of *Euchloë cardamines*, bred from ova obtained in South Cork, with the hind wings of an ochreous yellow. Coloured drawings, illustrating the life-history of the specimen in all its stages, were exhibited. Mons. Sergé Alphéraky communicated a paper entitled "On some cases of Dimorphism and Polymorphism among Palæarctic Lepidoptera."—H. Goss, *Hon. Sec.*

South London Entomological and Natural History Society.—*July* 23*rd*, 1891.—The President in the chair. Mr. Turner exhibited specimens of *Bupalus piniaria*, L., from Westerham, among which were pale examples of the female. Mr. Hawes, living pupæ of *Pararge megæra*, L., on *Poa annua*, and stated that out of a brood of five dozen larvæ at least one-fourth of the pupæ were black instead of green, and there was also an intermediate form which was of a dull bice; he could find no record of black pupæ of this species. Mr. C. G. Barrett said it would be interesting to note if the variation was sexual. Mr. Dennis, a very strongly banded form of *Spilosoma lubricipeda*, Esp., and other specimens approaching it, all from his garden at Hackney. Mr. Nussey, bred examples of *Cucullia absinthii*, L. Mr. Waller, bred series of *Aplecta tincta*, Brahm., *Triphæna fimbria*, L., *Eupithecia venosata*, Fb., and *Dianthœcia carpophaga*, Bork., from the Home Counties. With regard to the last-named species, Mr. Barrett made some remarks, and pointed out that one specimen had five wings. Mr. Tugwell, a very fine series of *Zygæna exulans* var. *subochracea*, White, captured at Braemar in 1891; also Swiss examples, to show the great difference between the two forms. Mr. Billups, several species of British Diptera, including *Sapromyza platycephala*, Lew., from Dulwich and Oxshott, Surrey, *Chlorops hypostigma*, Meig. (Dulwich), *Oxycera terminata*, Meig. (Dulwich), *Pipezella annulata*, Mg., one specimen, *Clidogastra punctipes*, Mg., *Oxyphora arnicæ*, L. (all from Oxshott); the first two species, Mr. Billups stated, were not included in Mr. Verrall's list, and the last four were only included in that list as reputed British.

August 13*th*.—The President in the chair. Mr. J. Jenner Weir exhibited the cases containing living larvæ of *Psyche villosella*, Och. (the produce of the eggs of July in the present year), the cases from which the imagines had emerged, bred from eggs of 1889, and the perfect insects, male and female, and contributed notes thereon. Mr. Weir also exhibited a pair of *Pyrameis degeerii*, Godt., and remarked that it would be seen the male was scarcely, if at all, distinguishable from *Pyrameis cardui*; the female, on the other hand, resembling a faded *P. atalanta*. Mr. Weir made some interesting observations relative to his exhibit. Mr. C. Fenn exhibited a female specimen of *Odonestis potatoria*, L., with male coloration, from Deal. Mr. J. H. Carpenter, a finely marked variety of *Epinephele hyperanthes*, L., the spots on the under side being unusually large and elongated; a bred series of *Melitæa athalia*, Rott., from Essex; and *Cucullia asteris*, Schiff., from Folkestone. Mr. West, *Apamea ophiogramma*, Esp., from his garden at Streatham. Mr. Watson also showed *A. ophiogramma*, and a small bred series of *Ocneria dispar*, L. Mr. C. A. Briggs, *Heliothis peltigera*, Schiff., dark forms from Devon, pale forms from Tuddenham, Suffolk, and Folkestone, Kent, and asked whether both forms had been taken together. Mr. Herbert William, an hermaphrodite specimen of *Pieris rapæ*, L., taken at Box Hill. Mr. Frohawk, a fine series of unusually large females of *Euchloë cardamines*, L., from Kent. Mr. Tugwell, *Nephopteryx abietella*, Zinck., bred from Scotch fir-shoots; also dark varieties of *Pyralis farinalis*, L., and a streaked variety of *Botys urticalis*, Schiff. Mr. Hawes, living larvæ of *Syrichthus malvæ*, L., and *Nisoniades tages*, L. —H. W. Barker, *Hon. Sec.*

Birmingham Entomological Society.—*July 20th*, 1891.—Mr. R. C. Bradley in the chair. Mr. G. H. Verrall, F.E.S., was present, and delivered a lecture on "Diptera." He said he had come down with the hope of inducing members to take up the study of the group, which possessed many recommendations not possessed by the other orders of insects. It is almost unworked, so much so that all workers are bound to be able to do some original work. Unlike Lepidoptera and other well-worked orders, which hardly ever receive an addition to the British list, the Diptera can be added to extensively, and he had added some hundreds of species already. Another recommendation to the group is that it is not necessary to go far for fresh material to work at; in his own garden, at Newmarket, he had taken 500 species. He briefly described the classification and characters of the orders, and then took the various families in review, describing all their salient points, and giving many interesting particulars about them. Mr. C. J. Wainwright proposed a vote of thanks, which was seconded by Mr. C. H. Kenrick, supported by Dr. Mason, and replied to by Mr. Verrall.—Colbran J. Wainwright, *Hon. Sec.*

OBITUARY.

With deep regret we recorded, in our last number, the death of Mr. Ferdinand Grut, F.L.S., the Honorary Librarian of the Entomological Society of London. Mr. Grut was elected a Fellow of the Linnean Society on 1st February, 1872, but his connection with the Entomological Society was much earlier, he having been elected in 1846; and, after having served on the Council, was chosen as one of the Secretaries on 23rd January, 1871, and worthily filled that office until 16th January, 1878, when he undertook the duties of Honorary Librarian. To say that he efficiently performed the duties of that office up to the time of his lamented decease, would but feebly convey the value of his services to the Society. Mr. Grut was almost every Wednesday in the library, and was engaged for years in preparing a complete catalogue of the books. This he had finished; and it was with hope that he looked forward to the period when it would be printed for the use of the Fellows. The Society could not indeed pay a more graceful tribute to his memory than at once to take steps to have the Grut catalogue published. Mr. Grut was one of those excellent men who did good, one might say, by stealth, and would have gladly avoided the warm recognition of his valuable services, which at each annual meeting was so enthusiastically given by the Fellows of the Society. Mr. Grut was for many years engaged in the study of the Geodephaga, of which he possessed a very valuable collection. By the death of Mr. Grut, on 19th July, at the age of 71, the Entomological Society of London sustains an almost irreparable loss. It is improbable that a successor, in the office of Honorary Librarian, could be found who would devote so large a portion of time as one day each week to the duties of that position. All who knew Mr. Grut will regret to lose a kind-hearted and courteous man, of singularly equable and amiable disposition.—J. J. W.

THE ENTOMOLOGIST.

VOL. XXIV.] OCTOBER, 1891. [No. 341.

ON *PYRAMEIS DEJEANII*.*

BY J. JENNER WEIR, F.L.S., F.Z.S., &c.

THE male of this insect is scarcely, if at all, distinguishable from *Pyrameis cardui*; the female, on the other hand, resembles a faded *P. atalanta*, the red band on the fore wings of the latter species being replaced in *P. dejeanii* by a creamy white one, and the submarginal red of the lower wings in *P. atalanta* becomes subdued in *P. dejeanii* to a dull brown, and the spots of black are far more developed in size, but not quite so dark.

That there should be so marked a difference between the sexes in this insect is the more remarkable, because in the rest of the species of the genus *Pyrameis* the difference between the coloration of the sexes is very slight. In *P. itea*, *P. hippomene*, *P. callirhöe*, *P. cardui*, *P. kershawii*, *P. virginiensis*, it is inappreciable, and in *P. atalanta* it consists in the female having a white spot in the red band of the upper wings, which is absent in the male, at least this is generally the case.

P. dejeanii is found, I believe, in the island of Java only; and when, some years ago, I obtained a large number of butterflies from thence, I was struck by the dull appearance of them; a certain duskiness or, as I should term it, phæism seemed to be characteristic of many species which had far more brilliantly coloured allies both in Sumatra and the Asiatic continent; for instance, the dusky-coloured *Salatura intensa* of Java, as compared with the brightly-coloured *S. sumatrana* of Sumatra, *S. intermedia* of the Malay Peninsula, the typical *S. genutia* of continental India, and the white ground colour of *S. edmondii* of the Philippines.

So also the *Salatura melanippus* of Java, its very name suggesting its phæism, as compared with the brightly-coloured

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* Abstract of a paper read before the South London Entomological and Natural History Society, Aug. 13th, 1891.

S. hegisippus of Sumatra and Burma, and the Bornean *S. lotis* with the ground colour of the wings white.

Java lies under the equator, and one would have expected to find its butterflies brilliantly coloured; but there must be some cause which produces the phæism adverted to. The only suggestion which has occurred to my mind, and it is purely hypothetical, is whether there is any connexion between this duskiness of the insects and the murkiness of the atmosphere, the result of the irruption of its numerous active volcanoes.

NOTES ON THE LIFE-HISTORY OF *PSYCHE VILLOSELLA*.*

By J. Jenner Weir, F.L.S., &c.

The males of *P. villosella* emerge from the cases about the latter end of June or during July, leaving the empty pupa skin projecting from the case about one-third of an inch; the female in most instances does not leave the case, but clears the emergent end by pressing herself out about a quarter of an inch; the male appears to be able to fertilize the female by forcing his body into the case, and thus reaching the female. The abdomen is singularly extensile, increasing to more than double its length at emergence.

The female, after fertilization, withdraws herself within the case, and deposits her eggs at the bottom of the old pupa skin, where they remain until the young are hatched. I could not ascertain how many days the eggs remained before the young appeared, but should think about ten or twelve, probably varying somewhat according to the heat of the weather. The old pupa skin remains in the case after the appearance of the young, but I could not find any trace of the skin of the female imago, and I am inclined to think that it is eaten by the young larvæ. From some of mine the young swarmed out of the case at the emergent end, which, I may here remark, is the reverse of the feeding end. Others I cut open, and released the young; they were at once very active, and moved quickly about, their bodies held at an angle of 45°. I could not see that they used any prolegs; locomotion was effected entirely by their true legs. They at once began to make themselves cases, and in three or four hours were all furnished with clothing; for this purpose I supplied them with fine strips of heath and small pieces of moss. Although generally found on heath, they seem in their earlier stages to prefer more succulent food, such as bramble, strawberry, whitethorn, and sloe.

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* Abstract of a paper read before the S. L. E. and N. H. S., Aug. 13th, 1891.

During the whole of last winter I had some fifty larvæ, collected in 1890, the produce of the eggs of 1889, feeding on my lawn, under a large framework covered with net in the usual manner. They were quite unaffected by the severity of the winter, and almost all survived till the spring; but it is a singular fact, that although they had been protected from enemies for more than a year, yet many of them produced ichneumons, which must have lived in their hosts since July, 1890, at least.

The females, if removed from the cases, are the most helpless imagines I ever saw, far more so than *Psyche nitidella*; they have neither eyes, mouth, antennæ, legs, or wings, and merely wriggle very slightly, and continually make an annular constriction of their bodies, which slowly passes down from the head to the extremity of the abdomen.

Although in this country there are several species of Heterocera in which the female is apterous, yet in all these instances the legs are developed, and some traces of the wings, except in *Psyche*, are found. In no case is an apterous male known; but I saw, nearly fifty years ago, a moth taken by Mr. Darwin in Kerguelen's Island, which was apterous in both sexes.

NOTES ON BUTTERFLIES FROM THE APENNINES.

By Frank B. Norris.

The situation of Boscolungo, or Abetone, as it is sometimes called, among pine and beech forests, at the summit of the pass, between Lucca and Modena, is most beautiful. Mountains rise innumerable in all directions. Cimone, the highest of all, 7200 ft., affords a magnificent view, the Adriatic and Mediterranean being both visible in clear weather, and occasionally the Alps, 250 miles away. For botanists, such varieties as *Epipogon aphyllus*, Sw. (the scarcest of European Orchidaceæ), *Globularia incanescens*, Viv., *Geranium argenteum*, *Leontodon anomalus*, Ball, *Bromus serotina*, &c., are easily found. The hotels are excellent and well managed, and there is an entire absence of the rush and noise, so irksome to many, that is unfortunately too common in Switzerland. The climate, I may add, is magnificent, cool and bracing during the hot months, and one can sleep with open windows at the present time. The following species of Rhopalocera were captured between July 4th and September 4th of this year:—

Parnassius apollo, L.; common on higher slopes until time of writing. *P. mnemosyne*, L.; taken by an acquaintance, July 24th.

Aporia cratægi, L.; common. *Pieris brassicæ*, L., *P. rapæ*, L., *P. daplidice*, L.; all common.

Euchloë belia, F.; occurs sparingly on summits. *Leucophasia sinapis*, L., and varieties; common. *Colias edusa*, F., common up to date. *C. hyale*, L.; less common.

Gonepteryx rhamni, L.; fairly common, July.

Thecla ilicis, E.; locally common.

Polyommatus virgaureæ, L.; swarmed during July and August (females varied much in depth of black markings). *P. alciphron*, Rott., var. *gordius*, E.; abundant. *P. dorilis*, Rott.; very uncommon, July. *P. phlæas*, L.; rather common.

Lycæna telicanus, Hb.; one specimen at an altitude of 6000 ft., end of August. *L. ægon*, Schiff.; exceedingly abundant. *L. astrarche*, Berg.; common. *L. icarus*, Rott., *L. escheri*, Hb.; both abundant. *L. amandus*, Hb.; fairly common, July. *L. bellargus*, Rott.; rather rare. *L. corydon*, Poda.; very common. *L. meleager*, E.; very local, and the females especially difficult to find; altitude 3500 ft.; began appearing latter half of July and through August. *L. argiolus*, L.; rather scarce, July. *L. sebrus*, Bdv.; very scarce and local. *L. semiargus*, Rott.; more common. *L. minimus*, Fuessly; local, but numerous. *L. arion*, L.; scarce in July. *L. alcon*, F.; abundant, but very local.

Vanessa c-album, L., *V. polychloros*, L., *V. urticæ*, L., *V. antiopa*, L., *V. atalanta*, L., *V. cardui*, L.; all common. *V. io*, L.; very seldom seen.

Melitæa athalia, Rott.; abundant.

Argynnis paphia, L., *A. adippe*, L., and var. *cleodoxa*, O., *A. aglaia*, L.; all common. One specimen of *aglaia* taken in July has a great deal of black marking of a most unusual character; on upper surface, and below on hind wings, there is a great suppression of silver markings, those in the centre being confined to three small round spots, those near body larger than usual, and the row of marginal silver lunules almost invisible. The lower wings show a beautiful green effusion of two or three shades on under surface. *A. niobe*, L.; on highest mountains. *A. latonia*, L.; common. *A. euphrosyne*, L.; nearly over in July. *A. daphne*, Schiff.; common in valleys running down from Boscolungo, July and August.

Melanargia galathea, L.; common, but smaller than at Bagni Lucca.

Erebia epiphron, Kn.; common locally; var. *cassiope*, F., less common. *E. medusa*, Hb.; common; var. *psodea*, Hb., local. *lappona*, E.; rather scarce. *E. tyndarus*, E.; common on heights. *goante*, E.; common, July and end of August. *E. æthiops*, E.; summits, August; *E. ligea*, L.; common in woods. *E. euryale*, E.; abundant on mountains; the markings on under side varied much.

Satyrus alcyone, Schiff.; July, August, September, abundant valleys. *S. circe*, F.; rather scarce, August.

Pararge mæra, L.; common locally, July and end of August. *megæra*, L.; scarce, July. *P. egeria*, L.; uncommon.

Epinephele ianira, L., and var. *hispulla*; common.

Cœnonympha pamphilus, L.; abundant. *C. arcania*, L.; very common.

Spilothyrus alceæ, E.; scarce, August.

Syrichthus malvæ, L.; here and there.

Nisoniades tages, L.; common.

Hesperia thaumas, E., *H. lineola*, O., *H. actæon*, E., *H. sylvanus*, E., *H. comma*, L., and var. *catena*, Stgr.; abundant.

At Bagni di Lucca, three or four hours' drive below this, I found in June, besides many of the above, also:—

Spilothyrus lavateræ, E.; common on stony slopes.
Syrichthus orbifer, Hb.
Melitæa didyma, O.; in Serchio valley. *S. phœbe*, Kn.; scarce.
Limenitis camilla, F.; common.
Apatura ilia, aberr. *clytie*, Hb.; over poplars in Serchio valley.
Vanessa egea, Cr.; abundant in sheltered places.

Hôtel de Florence, Viareggio, Sept. 6th, 1891.

THE COLOURS OF INSECTS.

BY T. D. A. COCKERELL, F.Z.S.

MR. COSTE's notes on the colour-variation of Lepidoptera (Entom. 186—192) are very interesting, and would be still more so if they were supplemented by anything like a complete account of the recorded varieties or aberrations belonging to the classes he mentions. I am too busy with other matters now to attempt to prepare any such account, but cannot refrain from making a few scattered observations.

(1). There can be little doubt that changed conditions lead to variability; thus, there is great variability among animals bred in confinement; and again, species imported into new countries (*e. g.*, European species into New Zealand and North America) show much variation. I have lately been collecting notes under this head, and may some day publish details. It is hardly necessary to remark that Darwin has given an admirable and detailed discussion of this subject in his 'Variation of Animals and Plants under Domestication.'

(2). As to blue varieties (p. 190), see Entom. xxii. 127. The Acrididæ show, I think, a blue pigment, which varies to red and perhaps also to green. With *Catocala* the case is hardly so clear. *Sesia* (*Ægeria*) has the bands on the body sometimes yellow, sometimes red, and I have found a new species,* in Colorado, in which they are white and blue. Mr. Jenner Weir showed me Danaine butterflies of the genus *Tirumala* in which the white marking is becoming blue, but this is a physical colour, remaining, as he told me, after the insect had been treated by the "Waterhouse process."

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* *Ægeria*, new species.—Smallish; wings orange; belts on abdomen white and blue, the first white, the second blue, the third white, the fourth blue, and the fifth and sixth white and blue: near the Beckwith Ranch, Custer Co., Colorado, Sept., at flowers of *Bigelovia*. The type is in the collection of the late Mr. Henry Edwards, who informed me that it was new, and he was intending to describe it. I do not publish the MS. specific name I had given it in my notes, as I have no full description, and the insect is no longer at hand.

(3). Colourless varieties of chestnut species are not *always*, I think, "unhealthy or pathological." Mr. Jenner Weir showed me two remarkable species of butterflies which seem to be noticeable in this connection. *Salatura conspicua*, Butler, from Celebes, has the under-wings brown, with the cell white, in striking contrast; but an allied Philippine Island species has all white on the secondaries in place of brown.

(4). There are, of course, some white varieties of yellow species on record, but, as a rule, this kind of variation is rare. However, the white females of *Colias* are familiar to every entomologist. In *Triphæna comes* there is an aberration (sometimes only on one side) in which the hind wings are pale instead of the usual yellow. This, no doubt, is a case of atavism. Among flowers, white varieties of yellow species are very rare, though they occasionally occur, *e. g.*, in *Eschscholtzia californica* and *Aquilegia chrysantha.*

(5). As to yellow varieties of green species, there are excellent examples among birds. The wild canary, which I have myself seen at Funchal, Madeira, is green,—the domesticated bird being, as everyone knows, bright yellow. *Palæornis torquatus*, an Indian parrot, is typically green, but there is a var. *lutescens*, which is yellow. Both the type and the variety may be seen at the British Museum.

(6). For a red variety of a yellow species (p. 192), see *Arctia villica* var. *fulminans*, mentioned in Entom. xxii. p. 2.

(7). In the case of the variety of *Arge galathea*, mentioned by Mr. Coste on p. 192, was it not the *black* that gave way to red? That black varies to reddish in some butterflies seems almost certain. In Mr. Jenner Weir's collection I saw *Caduga titya*, Gray, in which the marks on the primaries are black, while those on the secondaries are rusty-brown. Now this species has two mimics, coloured in *exactly* the same way, namely, *Hestina nama*, Dbl., and *Papilio agestor*, Gray. Thus there must have been variability towards black or red, and I suppose it likely that originally black markings varied to the rusty-brown we now see.

From what we know of the power of certain reagents to change the colours of insects, it is evident that "varieties" without a satisfactory history must often be looked upon with suspicion. *Danais plexippus* ab. *fumosus* (Hulst) * has the wings sooty-brown instead of bright fulvous. I have seen the type of this form in Mr. Hulst's collection at Brooklyn, and from what he told me there can be no doubt that it is a genuine variety. Yet the very same thing can be produced by artificial means! In the museum of the Institute of Jamaica, I found a specimen just like Mr.

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* *Danais archippus* var. *fumosus*, Hulst, Entom. Amer., ii. 182. See also Entom. Amer., i. 140 and 159, where evidence is given as to the existence of this form alive, and also as to the production of a similar colour artificially by cyanide.

Hulst's type, and had already labelled it "var. *fumosus*, Hulst," when, suspecting something wrong, I questioned Mr. Bowrey, who obtained it, and he told me at once that it had been changed in the ammonia bottle, and was, when caught, quite an ordinary specimen! It had been put into the cabinet by mistake.

At the British Museum I saw a coloured drawing of a butterfly caught by Capt. C. H. Whitaker at Newcastle, Jamaica, early in 1889. It agrees with *Callidryas sennæ* in all respects, except that it is brilliant scarlet. Here, I must confess, I am inclined to blame the cyanide bottle. We have in the museum here, a specimen of *C. sennæ* marked asymmetrically with scarlet on the secondaries, in such a manner as not to leave the remotest doubt that the marking was produced artificially—though no doubt accidentally.

Institute of Jamaica, Kingston, Jamaica, August 22, 1891.

NOTES ON THE NATURAL HISTORY MUSEUM OF BERGEN.

By the Rev. F. A. Walker, D.D., F,E.S.

The collection of insects belonging to the Natural History Museum at Bergen is arranged in two cabinets of fifteen drawers each. In the first of the said two cabinets may be seen, in addition to other specimens, the general collection of Coleoptera, which was very well arranged and named, by a German entomologist, some years since. The two top drawers of the second cabinet are devoted to the Diurnal Lepidoptera of Norway, and have been well and carefully named, as I was assured, and as far as my own knowledge enables me to testify. But the specimens are in several instances old, faded, and indifferent as regards both condition and setting, and not set uniformly moreover. This state of things was fully admitted by the curator present, who stated that their attention had been chiefly directed to higher forms of Nature, such as mammals and birds, and to other lower forms, to the exclusion of insects. Dr. Brunchorst (such was his name) owned to very little knowledge of insects himself, and said that the entomological curator was absent just then, taking his holiday in the country. At my request he kindly took out a drawer of Neuroptera, which I wished to consult in reference to an *Æschna* I had recently captured, and which on my return home I discovered to be *juncea*. But such few dragonflies as were represented, and which all belonged to the genus *Æschna* or *Libellula*, were only named generically, and not specifically at all. Whether British species or exclusively Norwegian, *Æschna* was the only name given. The two drawers of butterflies above mentioned contained, in addition to the Norwegian kinds, a few North American and tropical specimens, chiefly of the genera *Melitæa* and *Terias*. Lower down in the same cabinet was a representative collection of other tropical kinds, chiefly Papilionidæ and Morphinæ, but in no way remarkable in respect of extent, condition. or variety. The contents of the first drawer of Norway butterflies were as follows:—

Papilio machaon, *Doritis* (*Parnassius*) *apollo*, *Aporia cratægi*, *Pieris brassicæ*, *P. napi* and var. *bryoniæ*, *P. rapæ*, *Anthocharis cardamines*, *Leucophasia sinapis*, *Colias palæno*, *C. hyale*, *C. edusa*, *C. hecla*, *C. nastes*, *Gonepteryx rhamni*, *Zephyrus* (*Thecla*) *quercus*, *Thecla rubi*, *Aphantopus* (*Epinephele*) *hyperanthus*, *Polyommatus virgaureæ*, *P. hippothoë*, *P. phlæas*, *Lycæna argus*, *L. astrarchè*, *L. optiletes*, *L. pheretes*, *L. argyra*, *L. icarius*, *L. alexis*, *L. argiolus*, *L. aquila*, *L. minima*.

Many of the above species are only represented by a single specimen, as *Pieris rapæ*, *Colias hyale*, *C. hecla*, and *C. nastes*; many, again, by only two, as *Papilio machaon* and *Aphantopus hyperanthus*. One specimen of *C. palæno*, ticketed *Papilio palæno*, would seem to be of ancient date, and another label, *Colias palæno*, has been added underneath. The specimens are not all in regular order in respect of species. After a few intervening insects of other kind or kinds, occurs a white specimen of *C. palæno*, presumably a female; and a little further on two more males. Of no one species, so far as I recollect, were there as many as ten specimens. Of the common Pieridæ *Pieris brassicæ*, and of the large Fritillaries *Argynnis aglaia*, were the most numerously represented; and I should judge them to be the two commonest species of their respective tribes, as *A. aglaia*, occurring sparingly at first, became more numerous as July advanced, whereas *paphia* and *adippe* were not seen at all; and I ordinarily saw two or three specimens of *P. brassicæ* every morning, but only three or four of *P. rapæ* during the whole of my tour. Var. *bryoniæ* of *P. napi*, in the museum, was scarcely as dark as I had previously been led to consider that insect.

The contents of the second drawer of Norway butterflies were as follows:—

Vanessa urticæ, *V. c-album*, *V. antiopa*, *V. atalanta*, *V. cardui*, *Melitæa delia*, *M. artemis*, *M. cinxia*, *M. dictynna*, *M. athalia*, *M. parthenie*. *Argynnis pales*, var. *arsilache* and var. *lapponica*, *A. polaris*, *A. frigga*, *A. thore* var. *borealis*, *A. euphrosyne*, *A. selene*, *A. ino*, *A. lathonia*, *A. aglaia*, *A. niobe*, *A. adippe*, *A. paphia*, *Erebia lappona*, *E. ligea*, *E. disa*, *E. embla*, *Pararge egeria*, *P. megæra*, *E. mæra*, *Epinephele ianira*, *Cænonympha hero*, *C. pamphilus*, *Satyrus semele*, *S. briseis*, *Œneis jutta*, *Œ. bore*, *Œ. norna* (one specimen each of last three species), *Syrichthus malvæ*, *S. andromedæ*, *S. centaureæ*, *Nisoniades* (*Thanaos*) *tages*, *Hesperia lineola*, *H. sylvanus*, *H. comma*, *Cænonympha typhon* (one specimen).

REMARKS ON THE VARIATION OF *ZYGÆNA FILIPENDULÆ*.

By Richard South.

There are several forms of *Zygæna filipendulæ* known to entomologists, and it will be convenient to refer to these in the present paper in order corresponding with the amount of divergence from the type.

Var. *a.* (*ochsenheimeri*, Zell.)—Characterised by the more decidedly blue tint of the wings; the sixth spot is intersected by a nervule, and the upper one of central pair is usually smaller than its fellow; the hind wing has a fairly broad border.

This variety was first noticed in Britain by Mr. C. J. Boden, who records it as occurring in the metropolitan district during the month of May. I have taken examples at Folkestone, at the end of July, which have the sixth spot intersected, but the colour does not quite agree with typical *ochsenheimeri*.

Var. *b.*—The two outer spots confluent.

Not an uncommon form at Folkestone and Ventnor, and probably elsewhere.

Var. *c.*—The middle pair of spots confluent.

Less common at Folkestone and Ventnor than var. *b.*

Var. *d.* (*cytisi*, Hübn.)—Each pair of spots confluent, forming transverse bars.

Probably not an uncommon form in some localities; but I have only met with two examples, which were detected among some hundreds of specimens of *Z. filipendulæ* on Folkestone Hill, during the last week of July and the first week of August, 1885.

Var. *e.* (*ramburii*, Ld.)—Spots confluent, as in var. *cytisi*, but they are dull scarlet in colour, as also are the hind wings.

I took a specimen at Folkestone, which agrees in colour with this form, but the central pair of spots are not confluent.

Var. *f.* (*cerinus*, Robson).—The hind wings and spots on fore wings are yellow instead of red.

This striking variety has occurred at Winchester in some numbers. It has also been found in a chalk-pit, during the first week of July, near Cambridge; and there are records of its capture at Birkenhead, Plymouth, Maidstone, and Finchley. Mr. W. Jagger, of St. Ives, Hunts, bred a specimen of "a splendid orange colour instead of red," and two others "had one under wing red and the other orange" (E. M. M. vi. 117).

Var. *g.* (*mannii*, H.-S.)—Wings thinly scaled; the colour of spots and hind wings darker than usual.

This is an alpine form, and, so far as I know, not represented in Britain. I have specimens from Folkestone, which are very barely scaled, but the spots and hind wings are pale in colour, reminding one of *Z. exulans* var. *subochracea*, White.

Var. *h.*—The basal and middle spots connected by a longitudinal streak of red.

I have seen this form in collections, but do not possess a good example of it. In a Folkestone specimen I have there is a projection from the lower basal spot towards the lower spot of middle pair.

Var. *i.*—All the spots united, forming a flame-like reddish streak.

Stephens mentions this form, but I have not seen an example of it.

Var. *j.* (*chrysanthemi*, Esp.)—The usual crimson of spots and hind wings is replaced by a dark colour, ranging from dark brown to bluish black.

Mr. J. E. Nowers (Entom. xv. 39) records the capture of a specimen of this curious aberration in Wyre Forest, on July 3rd, 1881, and describes it as follows:—"The fore wings are of the usual dark green, the spots being black; the hind wings are black, with a dark green margin. The insect measures 1 inch 2 lines, and the spots are rather small." This specimen is now in the collection of Dr. P. B. Mason; and Mr. H. Goss has a similar one, which he captured at Rhinefield in the New Forest, on the 15th of July, 1890. I am indebted to Mr. Baxter, of St. Anne's, for a modified example of this form. In this specimen, which was bred from pupæ obtained in Lancashire, the spots and hind wings are suffused with dark brown.

In addition to the foregoing varieties, there is a form, generally referred by British entomologists to *Z. filipendulæ*, which has the sixth spot either very small or altogether absent from the upper surface. Some of the examples of this form have the border of hind wings rather broad, and these have been considered as probably hybrids between *filipendulæ* and *trifolii*. It has been observed at or near Pembroke, at Folkestone (E. M. M xix. 21, 43), and at Marlborough (E. M. M. xxv. 184).

The borders of hind wings are usually narrow, but in some specimens, which are quite typical in other respects, they are quite as broad as in *trifolii*. Sometimes the hind wings have irregular and asymmetrical patches of pale orange. I have several specimens marked in this way, all taken at Folkestone in 1885; one of these has the sixth spot on left fore wing also pale orange, while the corresponding spot on the right wing has only a small patch of pale orange on its upper portion.

With regard to the shape of the wings, I have not, so far, observed much aberration; but I have one specimen in which the fore wings are rounded, as in *Z. exulans*.

Lederer has observed that, in Transcausaria, *Z. filipendulæ* gradually becomes changed into *transalpina*, Hub., and *charon*, Boisd. (two insects generally known under the name of *Z. trifolii* var. *dubia*, Staud.), but Christoph would appear to hold the opinion that *dubia*, Staud., and also *stoechadis*, Bork., are southern alpine forms of *loniceræ*. It would seem, then, that the true position of *dubia*, Staud., is not definitely determined at present; it may be either a form of *trifolii* or of *loniceræ*, but, at the same time, it is connected by intermediate links with *filipendulæ*. It is larger than typical *trifolii*, has either five or six spots, and the hind wings are broadly bordered with black. Our five-spotted *filipendulæ* appears to fit in here; and is, I think, really referable to *dubia*, Staud.

ON NEW BRITISH DIPTERA.

By G. H. Verrall, F.E.S.

Writing in the 'Entomologist' last year (Entom. xxiii. 154) concerning British Diptera, I said, "A vast amount of work remains yet to be done, but it had better be done with caution."

I was very much interested in Mr. Billups' account of the Entomology of Oxshott in your last number (Entom. 201—204); but before incorporating any fresh species into the list of British Diptera, I preferred to act upon my own observations, and consequently wrote at once to Mr. Billups to ask if he would kindly let me see the more interesting specimens. I am very much obliged to him for placing them in my hands the next day, but I am sorry to say that the result has confirmed me in my decision to act upon my own observations.

Oxycera terminata, Mg.—I believe Mr. Dale's specimens of this species will confirm it as British; but all three of Mr. Billups' are *Pachygaster leachii*, Curt.

Pipunculus geniculatus, Mg.—I believe I possess this, and about fifteen more species of unrecorded *Pipunculi;* but until they are more carefully studied and described, mere names are useless.

Pipizella annulata, Mcq.—Mr. Billups' specimen is a female of the not uncommon *P. flavitarsis*, Mg. (=*biguttata*, Curt.). *P. annulata* may be a synonym, but is a very doubtful species.

Clidogastra punctipes, Mg.—I do not know enough about the Cordyluridæ to name a species with certainty, but I confidently say that Mr. Billups' specimens do not even belong to the genus *Clidogastra.*

Oxyphora arnicæ, Fln.—Is rightly named; but Fallen's *arnicæ* is only a synonym of the very common *O. miliaria*, Schrk. (=*flava*, Geoff.). *T. arnicæ*, L., is a widely different species. Loew, in his latest writings, merged *Oxyphora* and *Oxyna* in *Tephritis.*

Sapromyza platycephala, Lw.—I have already written of this as an almost impossible British species; but beyond that, my small knowledge of this group suffices to state with certainty that Mr. Billups' specimens do not belong to the family Sapromyzidæ!

Chlorops hypostigma.—I might have had considerable trouble in saying that this was not a specimen of the much debated *C. hypostigma*, Mg., but for the fact that the specimen does not belong to the Chloropidæ!

I would also repeat that *Pteropœcila lamed* is not yet properly recorded from Britain; our species is the little known *Toxoneura muliebris*, Har. (=*fasciata*, Mcq.).

As to misprints, near the bottom of page 203, for *Chrysophilus* read *Chrysopilus*, for *cylindricator* read *cylindrica*, and for *baumhauerri* read *baumhaueri*.

Many of Mr. Billups' captures at Oxshott are quite good enough to prove that the locality is a good one; and, from a specimen in front of me, I see that he caught an unrecorded British species there on August 16th, 1890, in *Sciomyza dubia*, Fln., a well-marked species of which I find I took a single specimen at Lynton on June 17th, 1883.

Let me repeat, "A vast amount of work remains yet to be done, but it had better be done with caution."

(I am extremely obliged to Mr. Verrall for his goodness in putting me straight in this matter of supposed new British Diptera; but, as I have previously stated, I am indebted to Dr. Meade for determining five of the species referred to by Mr. Verrall; the remaining three were identified by Mr. Brunetti. —T. R. B.)

NOTES ON THE PHYTOPHAGOUS GENUS *DIACANTHA*, Chev. (COLEOPTERA, GALERUCINÆ.)

By Martin Jacoby, F.E.S.

To my remarks (Entom. Suppl. p. 39) on the genus *Diacantha* (*Idacantha*, Fairm.), saying that M. Allard has created some confusion in regard to this genus and *Aulacophora* in not having recognised the distinguishing characters of both genera, and redescribing some old species by giving wrong descriptions of them, M. Allard has replied that I am totally mistaken, and giving his reasons for it. Further researches on the subject, in which Mr. Gahan, of the Entomological Department of the Natural History Museum, has kindly assisted me, seem to prove that my former remarks are only partially justified, which I am very pleased to own. The reason why I uttered them is as follows:—

Chevrolat first characterised the genus *Diacantha*, but in an unsatisfactory way, including several species in the genus which are not members of it as now understood. Chapuis, later on, described at length the genus in his 'Genera des Coleoptères,' giving the claws as bifid. Still later, von Harold, in the

'Coleopterologische Hefte,' in describing some new species of *Diacantha*, said that Chapuis was mistaken in describing the claws as "bifid;" *D. bidentata*, Fabr., which should be looked upon as the type, having appendiculate claws. I consequently followed von Harold, and excluded all species with bifid claws from *Diacantha*. In this I am, however, as well as von Harold, wrong, for the reason that, although *D. bidentata* is the oldest described species, it cannot be looked upon as the type, not being one of those mentioned by Chevrolat; and that Chapuis's diagnosis, giving the claws as bifid, must be accepted; while *Hypercantha*, Chap., will serve for the reception of species having the four posterior tibiæ mucronate, and possessing appendiculate claws.

My other remarks in regard to M. Allard's arrangements are, however, I think, justified. In his 'Synopsis of the Galerucinæ with a transverse thoracic groove,' the descriptions of *D. picea*, Fabr., and *D. chevrolatii*, Guér., are wrong and misleading. Of *D. picea* a type specimen, from the Hope Museum, is contained in the National Collection. This species has, however, nothing to do with *Diacantha*, but is identical with *Stenoplatys pascoi*, Baly.

In justice to M. Allard I thought this explanation necessary.

7, Hemstall Road, W. Hampstead.

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

By Arthur G. Butler, F.L.S., F.Z.S., &c.

The present paper was sent to the Entomological Society of London in continuation of articles already published in their 'Transactions' upon the same subject. It was read at a meeting held the 3rd June; but in the middle of August was, for financial reasons, returned to me by order of the Council. Much as I deplore the fact that the continuity of a series of articles on the same subject should be interrupted, it can hardly be expected that I should hold over important facts respecting the specific identity of types in the National Collection until the Entomological Society is in a position to print them.

The present paper completes the earlier group of Noctuæ represented by the Trifidæ of Guenée, and commences the Quadrifidæ. This natural grouping of genera was, unfortunately, not strictly followed out by its discoverer or by later authors, and its importance had to be insisted on by my friend, Mr. Hampson, before it was appreciated.

CYMATOPHORIDÆ.

Xylina mirabilis, from Japan, belongs to this family, and may be placed in the genus *Saronaga*, with which it agrees in structure; its remarkable pattern is indicated in *S. pudens* of the United States.

Casandria, *Walk.*

Casandria ? filifera.

♂ *Laphygma filifera*, Walker, Lep. Het. xi. p. 719 (1857).
♀ *L. ferrocana*, Walker, *l. c.*, p. 720 (1857).
♀ *L. nigriscripta*, Walker, *l. c.*, Suppl. 2, p. 649 (1865).
St. Domingo and Jamaica. In Coll. B. M.

BRYOPHILIDÆ.

Aquis, *Walk.*

Aquis viridisquama.

Aquis viridisquama, Walker, Lep. Het. xv. p. 1652 (1858).
A. albosparsa, Walker, *l. c.*, Suppl. 2, p. 611 (1865).
Dimirica nubifera, Walker, Journ. Linn. Soc. vii. p. 56 (1864).
Borneo and Java. In Coll. B. M.

Bryophila discitincta, Walk., is *Pachnobia imperita*, Hübn. In my opinion, *Nolaphana* should be placed in the Bryophilidæ, as also *Pseudina*. The genera *Cosmodes*, *Canna*, and *Jaspidea* are probably Cymatophoridæ.

NOCTUIDÆ.

Agrotis (*auct.*).

In his revision of this genus, Prof. John B. Smith has rather severely criticised my action with regard to some of the North American species, but especially *Amathes phyllophora* (to which, by the way, I must add *Mythimna subporphyrea*, Walk., as a synonym*). He points out that this species of Grote's differs in having spine-like bristles in rows along the anterior tibiæ, and he holds that these constitute not merely a good specific, but a good generic, distinction. It is possible that I may eventually have to use such apparently trivial characters for the breaking up of unwieldy genera; therefore, for the present, I will only say that, if constant, a character of this kind appears to be a sound one for distinguishing species.

Curiously enough, Grote mentioned the spinous character of the fore tibiæ in his description, yet, in his collection, specimens with and without these spine-like bristles stood together under both *phyllophora* and *alternata;* and although so good a lepidopterist as Grote would doubtless have discovered his error in labelling had he sat down to study his specimens, it was not to be expected that I should find out that an apparently variable character, in a series of specimens having the same pattern and allied to a variable European species, was of *at least* specific importance.

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* Walker's type is slightly faded and without abdomen, but is certainly typical *A. phyllophora*, which it will probably supersede.

Prof. Smith writes to me that I ought to compare the descriptions of types before associating the latter as synonyms. He seems to forget that I have to deal with the species of the whole world, and that to compare all the descriptions of what I consider synonyms would occupy more time than can be spared, if our collection is ever to be got into working order. Moreover, the catalogues hitherto published have one great fault; they do not, as a rule, give references, so that I should have to make a catalogue of the United States species, with references, before I could discover where the descriptions were published. I do not profess to do anything of the kind; I compare Grote's, Harvey's, and other types in the Grote collection, with Walker's, Guenée's, and other types in our collection, and if I believe them to be identical I say as much; and Americans ought to be glad to get even this help in clearing up their doubts, though I lay no claim to omniscience, and do not pretend to be incapable of occasional blunders, such as omitting to observe spine-like bristles inserted between the scales on the fore tibiæ of an ordinary-looking Noctuid. I think if Prof. Smith reflects upon these few observations, he will be less inclined to use the lash to those who are honestly attempting to work, however imperfectly, in his interest, no less than that of other American lepidopterists.

"*Orthosia*" *guttilinea*, Walker, Lep. Het. xv. p. 1709 (1858), is a faded specimen of the European *Amathes xanthographa*.

"*Caradrina?*" *posticata*, Walker, Lep. Het. xv. p. 1695 (1858), is *Amathes rubi* of Europe.

TOXOCAMPA, *Guen.*

ECCRITA, *Led.*

Lederer separates *Eccrita* from *Toxocampa* on the ground that the primaries are narrower by about one-half, and that the middle and hind tibiæ are set with long thinly distributed spine-like bristles. The relative narrowness of the wings exists more in fancy than reality, and the few scattered spines are even better shown in the middle tibiæ of *Toxocampa enormis*, but on its hind tibiæ it has only half the number; similar spinous tibiæ, I should imagine, would also occur in *T. maxima*. A character such as this is far more trivial than the difference between simple and pectinated antennæ; and where the species with or without spines have, as Lederer admits, the same pattern and general structure, and their larvæ the same appearance and manner of life, it seems quite clear that the presence of spines is a specific, and not a generic, character. The variability in the number of spines militates strongly against its value as a generic character.

The right of the Toxocampids to family rank may be questioned. In my opinion they are simply Noctuidæ, and nearly related to

Graphiphora (*G. augur*). They certainly do not belong to the later group of Noctuites, to which they are generally referred, as the radial vein of the secondaries passes through the centre of the discocellular veinlet.[*] The larvæ also have sixteen legs.

Strenoloma of Grote is not a Toxocampid, but belongs to the later group of Noctuites, the radial being emitted close to the third median branch. The black collar deceived Grote, as it did me, in the case of four or five other genera allied to it.

SEMIOPHORA, *Steph.*

Semiophora ochracea.

Graphiphora viaria, Swinhoe, Proc. Zool. Soc. 1889, p. 412.

Umballa. Type in Coll. B. M.

This is only one of the many slight variations of this very inconstant species. The same form occurred in Mr. Hocking's series of *S. ochracea*.

MAMESTRA, *Ochs.*

Mamestra chalcedonia.

Noctua chalcedonia, Hübner, Samml. Eur. Schmett., Noct., fig. 404.

Miana vincta, Walker, Lep. Het. xi. p. 730 (1857).

Celæna ? irresoluta, Walker, *l. c.*, p. 731 (1857).

Oligia tracta, Grote (see Check List, p. 28, n. 469).

United States. In Coll. B. M.

Mamestra radix.

Agrotis radix, Walker, Lep. Het. x. p. 332, n. 58 (1856).

Mamestra dimmockii, Grote (see Check List, p. 26, n. 350).

United States. In Coll. B. M.

HADENA, *Treit.*

Hadena arcta.

Hadena arcta, Lederer, Zool. botan. Vereins, 1853, p. 20, pl. 2. fig. 5.

Raphia fasciata, Butler, Ann. & Mag. Nat. Hist. ser. 5, vol. i. p. 193 (1878); Ill. Typ. Lep. Het. ii. p. 33; pl. xxxi. fig. 5 (1878).

Wladivostock and Japan. In Coll. B. M.

This species varies considerably in a long series, especially in size.

OLIGIA, *Hübn.*

Oligia festivoides.

Celæna festivoides, Guenée, Noct. i. p. 220, n. 348 (1852).

Coll. B. M.

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[*] r. Hampson for calling my attention to this valuable g the two great groups of this tribe of moths.

M. Guenée labelled his male variety with a name, which he appears not to have published. The species stood in the Grote collection as "*Hadena cephalica,* Grote"; but I do not find the species noted under *Hadena* in his Check List. We have his type.

The "*Nonagria*" *indubitans* of Walker belongs to this group, and is allied to his "*Laphygma*" *unisignata*, an example of which, in the Grote collection, is labelled, "*? Hadena paginata,* Morr." Walker's locality is based upon the fact that the specimen bears one of Doubleday's little yellow collecting-tickets. No locality is attached to the specimen.

Oligia exesa.

Celæna exesa, Guenée, Noct. i. p. 222, n. 352 (1852).
Hadena floridana, Walker, Lep. Het. Suppl. 3, p. 730 (1865).
Florida. Coll. B. M.

Walker's types consisted of a badly-rubbed male and a well-marked female, partly rubbed, but corresponding closely with Doubleday's other specimens, which formed the types of Guenée's species.

XYLOPHASIA, *Steph.*

Xylophasia apamiformis.

Xylophasia apamiformis, Guenée, Noct. i. p. 137, n. 216 (1852).
Hadena contenta, Walker, Lep. Het. vii. p. 754 (1857).
United States. In Coll. B. M.

HECATERA, *Guen.*

Hecatera erecta.

♂ *Celæna erecta*, Walker, Lep. Het. x. p. 264, n. 12 (1856).
♀ *Perigea? constipata*, Walker, *l. c.*, xi. p. 734 (1857).
Perigrapha innexa, Grote (on type label).
Mamestra innexa, Grote (Check List, p. 27, n. 377).
United States. Coll. B. M.

This species does not nearly resemble any other species known to me. I place it here provisionally, as the superficial characters appear to correspond with those of *Hecatera*. A closer examination may subsequently prove it to be the representative of a new genus.

ANOMOGYNA, *Stgr.*

Anomogyna? senescens.

Hadena senescens, Grote (see Check List, p. 27, n. 438).
Orthosia? semisigna, Walker, Lep. Het. xi. p. 748 (1857).
United States. Coll. B. M.

This is probably not distinct from Herrich-Schäffer's *Noctua crasis* (Schmett. Eur. ii. p. 361, n. 554; Noct. pl. 28, fig. 139). The latter is smaller and less boldly marked than Grote's type, but corresponds pretty closely with Walker's type; the latter is, nevertheless, a badly-rubbed specimen, the identity of which with

Grote's insect is only rendered certain when the two are compared under a lens.

XYLINIDÆ.

Lithophane, *Hübn.*

Lithophane antennata.

Xylina antennata, Walker, Lep. Het. xv. p. 1738 (1858).
X. cinerea, Riley, and *laticinerea*, Grote (see Check List, p. 33, nn. 773, 774).
United States. Coll. B. M.

I have spent a great deal of time without avail in the attempt to distinguish X. *laticinerea* from the larger specimens of Walker's species (the type is of the larger form). Grote's second specimen might, perhaps, be distinguished by the width of the central belt enclosed between the two ordinary transverse lines of primaries, and by the differently formed unbroken continuation of the orbicular spot; but this is clearly no more than an extraordinary variation of a very variable species, no two specimens of which are quite alike in markings, and which varies much in size. We have seven specimens labelled as *L. laticinerea*, nine as *L. antennata*, one as *Lithophane*, n. sp., and two as *L. cinerea;* the two last are the most distinct, because they are abnormally dwarfed specimens. If the whole of this series were to be mixed together, I do not believe any two lepidopterists would be able to agree as to how they should be sorted into two species again. Although I am personally satisfied of their identity, I have kept *L. antennata* separate from *L. laticinerea* in the cabinet, to see whether any lepidopterist will be able to imagine a character by which to distinguish them.

Walker identified specimens, without locality, of *L. pexata* as his *Lithomia buddhæ*, but he was totally in error; the description differs in almost every particular.

Lithophane signosa.

Xylina signosa, Walker, Lep. Het. xi. p. 627, n. 12 (1857).
Lithophane petulca, Grote (see Check List, p. 32, n. 763).
United States. Coll. B. M.

This is a rather variable species. Walker's type agrees better with Grote's second specimen than with his type, and still more closely with two other examples in his series. *L. signosa* approaches *L. ustistriga* of New Zealand in character, though in some respects it is nearer to *L. socia* of Europe.

The *L. signosa* of Grote's collection appears to me to be a perfectly distinct species, though identical with specimens collected by Mr. G. Norman in Canada, and presented to the Trustees in 1875, under the name of *L. petulca*. It differs in its comparatively broader and shorter wings, and generally greater resemblance to *L. socia.*

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

Gynandromorphous Lepidoptera.—I am preparing a list of gynandromorphous (hermaphrodite) Lepidoptera, and am desirous of making the list as complete as possible. I therefore venture to ask entomologists who may have any such specimens in their possession, particulars of which have not been previously recorded, to kindly communicate with me.—Richard South; 12, Abbey Gardens, St. John's Wood, London, N.W.

Acherontia atropos near Chichester.—A specimen of *Acherontia atropos* was taken in a village near this city, on June 15th. It had the appearance of having hybernated, though this may have been due to its having been roughly handled by its captor, a labourer, before it was brought to me.—Joseph Anderson, Jun.; Chichester.

The Emergence of Notodonta trepida.—Like Mr. South (Entom. 217), I, too, was indebted to the kindness of Mr. Christy for a few pupæ of *Notodonta trepida*, and was similarly struck with the erratic manner in which the moths emerged. It may be interesting to compare dates. The first moth came out on May 23rd, the second on May 28th, another on 31st; one on June 2nd, another on June 30th; the last, a small female, appearing on July 12th.—Joseph Anderson, Jun.; Chichester.

Apatura iris and Argynnis paphia var. valesina near Basingstoke.—I had the pleasure of taking a fine male *Apatura iris* on July 18th, in a wood near Basingstoke; and, in company with my friend Mr. Holdaway, I was fortunate in taking *Argynnis paphia* var. *valesina* in Hawkwood Park, on July 26th, my friend taking two more the following week. Although we have collected in the same place for the last twelve years, we have never seen it there before or anywhere in the district.—A. H. Hamm; Reading.

Psyche pulla.—Can any of your readers give me any information as to the habits of this species from personal observation or from any author, excepting Bruand? I always understood that the larva hatched at the end of summer, hybernated while small, and fed-up towards the end of spring, the imago appearing in the last week of May or early in June, sometimes even as late as July (*? radiella*). But on July 28th last my friend Mr. Vaughan found on grass a case, apparently of full size, which he kindly gave to me, knowing the great interest I took in the group. The case, when I received it, was firmly attached to the box, and remained so for about ten days, when the larva suddenly woke up, and has been lively and feeding ever since; but I can detect no increase in the size of the case. Other species of Psychidæ this year were unusually late, so this can scarcely be one of a second brood. Can it be that the larval state continues for two years, and that the larva hybernates when full-fed, and scarcely feeds in the spring at all?—C. A. Briggs; 55, Lincoln's Inn Fields, Sept. 14, 1891.

Captures at the Electric Light.—With reference to the note on this subject (*ante*, 172), I can confirm the fact of electric lights being often a great attraction for moths. The large incandescent lights on the Bund here, opposite the Grand Hotel, frequently have about twenty moths circling rapidly round them. The smaller lights on the Bluff, which give a poor and gas-coloured light, do not seem to have any special attraction for insects, although they are situated amidst trees, flowers, &c.; whereas the Bund lights are on a wide bare road, running along the sea-shore. Towards dusk every evening a lot of fishing-boats collect near this part of the Bund, awaiting the lighting of the lamps in order to commence fishing. Lots of Japanese are also always to be seen fishing from the sea-wall there; so evidently the light attracts fishes as well as moths.—T. E. Sansom; Yokohama, Japan.

Decoy for Butterflies.—I have noticed with interest Mr. South's remarks under the above heading (*ante*, 173). In various parts of the East I have found a dead *Ornithoptera* or *Papilio* an almost certain decoy, provided, of course, others of the species are about. In Java and Selangor (Malay Peninsula), when I caught a specimen too bad to keep, I always placed it in a convenient position for catching any others it might attract. Of course a good specimen could not be so treated, as in two minutes it would be carried off by ants. Here, in Japan, where ants, &c., are not so dangerous, I leave good specimens, also, for a few minutes, in conspicuous positions as decoys. With *Papilio maackii* it is certain to attract others. After half an hour or so the attraction seems to cease; so I doubt if a cabinet specimen of *Apatura iris* would be much use as a decoy.—T. E. Sansom; Yokohama, Japan.

Bait for Lepidoptera.—I have tried, in Java and Selangor, both decaying bananas and decaying pine-apple as bait for butterflies, but without success. I have also added turpentine thereto, and likewise used turpentine poured on to sand, stones, paper, grass, favourite trees, &c., but in every case without success. It is but fair to add that turpentine alone was only tried by me on about five occasions; but, should I return again to the tropics, I shall make further experiments with it. An almost unfailing attraction in the tropics, and also here in the summer,—as the heat just now almost equals that of the Straits,—is clean wet sand in the bed of a stream, or even in a tiny brook, at the side of a road. In Selangor I have seen lovely moving patches of colour, consisting of yellow *Terias*, *Catopsilia*, scarlet *Appias nero*, orange *Hebomoia glaucippe*, and two or three large *Papilios*, swaggering about amongst the smaller fry. Unfortunately, the number of good "specimens" resulting from such a find is usually small. The other day—here, in Japan—I caught nine out of a dozen *Papilio maackii*, but only two were in decent condition. Wet sand has a great attraction for "blues."—T. E. Sansom.

Hot Springs as an Attraction for Ornithoptera brookeana.—In connection with the preceding note, it may be of interest to mention that—from my own observations, and also from what others, both Europeans and Malays, have told me—this insect is strictly confined to the immediate neighbourhood of the numerous hot springs in Selangor. I believe the water contains sulphur, but not to any great extent. The only specimens of *Papilio delessertii* which I have caught or seen were settled on wet pebbles in the bed of a stream of hot water. To come across *Ornithoptera brookeana*, lazily flying about in such a spot, is a sight to be remembered.—T. E. Sansom.

Dwarf Lycæna icarus.—Diminutive specimens of *Lycæna icarus* (*alexis*) are by no means uncommon on the Downs near Eastbourne. I took three specimens last month (one male and two females), varying from 9 to 10 lines in expanse of wing. The Lycænidæ would appear to be particularly liable to vary in size, for Mr. Cockerell, in his article on the

"Variation of Insects" (Entom. xxii. 177), mentions this peculiarity in *Lycæna corydon* and *L. comyntas*, in addition to *L. icarus*. According to Mr. Tutt's opinion, referred to in the same article, these dwarfed specimens of *L. icarus* have been "reared on isolated food-plants insufficient for their needs."—Henry D. Sykes; The Cedars, Enfield, Sept. 21, 1891.

Cucullia absinthii in S. Devon.—As it is a local insect, it may interest your readers to know that on August 19th, 22nd, and 31st last, I obtained about twenty young larvæ of *C. absinthii* by beating *Artemisia absinthium*, at Slapton in Devonshire. I should be glad to know whether the insect has been taken there before.—Chas. Bartlett; Branscombe, Redland Green, Bristol, Sept. 12, 1891.

Acronycta alni in Somersetshire.—A fortnight since a larva of *A. alni* was found on a dwarf rose tree in my garden. It has since become a pupa, in a slight web. I would wish to note the first appearance of this species in this neighbourhood.—H. W. Livett; Wells, Somerset, Sept. 8.

Sphinx convolvuli near York.—A fine example of *S. convolvuli* was taken about 8.20 p.m. on September 2nd, at rest on one of the stakes supporting a chrysanthemum, at Lincroft, near York. The night was very dark and warm.—W. Hewett; 12, Howard Street, York.

Larva of Hadena pisi.—Yesterday I took several larvæ of *H. pisi* off heather, and naturally supposed they fed on it; but to-day, while watching them, I found them restless and apparently unsatisfied, though occasionally, *very* occasionally, one or another would just nibble a leaf or a flower of it. I then remembered that I had before now found the larvæ of *Saturnia carpini*, which are said to feed on heather, on willow; so I offered a leaf of that plant to one of these *H. pisi*. It took it at once; and now they are all feeding on willow as if it were their natural food. I may mention that, besides those I found on heather, I found one on furze and one on a small shrub, the name of which I do not know; and I noticed this morning that the leaves of this shrub, which I had put with the caterpillars, were entirely eaten, while the furze was untouched.—C. A. Bird; Rosedale, 162, Dalling Road, Hammersmith, W., Sept. 18, 1891.

Asthena blomeri, &c., in Buckinghamshire.—The Editor notes (Entom. 217) taking two specimens of *Asthena blomeri* on beech trees in a wood in Buckinghamshire. It may be interesting to some readers to hear that a few days ago I saw a long series taken in the same district and in the same way. My friend who took them was also lucky enough this spring to take a fine series of *Tæniocampa leucographa*.—A. Marshall; Sunnyside, Potter's Bar, Sept. 1, 1891.

Larvæ of Larentia didymata on Wood-sorrel.—In the last week of April, in a lane near here, I found a number of larvæ of this species feeding on the flowers of the wood-sorrel (*Oxalis acetosella*). The caterpillars were very numerous, there being several on almost every plant of wood-sorrel on each side of the lane for a distance of about half a mile. I took some, and fed them on the sorrel, which they eat readily; they sometimes attacked the leaves, but the flowers seemed to be their favourite food. They fed-up rapidly, and went down early in June. The first moth appeared on the 4th of July, and the last on the 6th of that month. I could find none of these caterpillars on sorrel, except in this one lane, although I searched a good deal for them; and since the 19th of July, when I saw the first imago in a state of nature, the moth has swarmed here. Is not the wood-sorrel an unusual food-plant for this insect?—John William Vaughan, Jun.; The Skreen, Radnorshire, Erwood, R. So., August 22, 1891. [In North Devon the larvæ of *L. didymata* occur in profusion on the flowers of a coarse kind of grass growing in the woods. Around London I have frequently found the larva of this moth on *Lychnis diurna*. The Rev. J. Seymour St. John, in his 'Larva Collecting and Breeding,' gives *Anemone nemorosa*, *Chærophyllum temulum*, *Anthriscus sylvestris*, and *Vaccinium myrtillus* as food-plants.—R. S.]

Bombyx lanestris five and seven years in Pupa.—From two larvæ of *Bombyx lanestris*, collected in June, 1882, Dr. A. Speyer bred one imago on April 4th, 1887, and the other in April, 1889. Both imagines were quite as fine as those which had passed but one year in pupa (Stett. Entom. Zeit., 1888, p. 205, *l. c.*, 1889, p. 140).

Captures at Sugar in Argyllshire in September.—I had come across three or four specimens of *Epunda lichenea* at rest on trees and posts, and so, on September 11th, I sugared along the road which runs through a wood, composed of oak and birch, on the shores of Loch Riddon, one of the arms of the sea which run up far inland into Argyllshire. The weather was very hot and the night still. The result was about—15 *E. lichenea*, 2 *Hydræcia micacea*, 1 *Triphæna orbona*, 2 *Calocampa vetusta*, 6 *Anchocelis rufina*, 1 *A. litura*, and 1 *Cerastis vaccinii*. On the 13th I sugared again in the same place. There was more wind this time, and torrents of rain were descending, so much so that it was difficult to keep the water out of the killing-bottles. There were several moths on each sugared tree, far more than on the previous occasion. *E. lichenea*, *A. rufina*, and *C. vetusta* were very common. There were also a few *Orthosia macilenta*, *O. lota*, *A. litura*, and *Calymnia trapezina;* and one worn specimen of *Calocampa solidaginis*. The *E. lichenea* are mostly worn. I have kept several females alive, and they are now depositing ova in cardboard pill-boxes. While sugaring I took a larva—*Amphidasys prodromaria*, I think. It is beautifully mottled with green and plum colour, and is only 1½ inch long. It was crawling on a wire-fence.—T. M. Christy; Watergate, Emsworth, Sept. 16, 1891.

Lepidoptera in Dorset, Berks, and Oxon.—In West Dorset, during the last ten days of June and the first ten of July, crowds of moths were attracted by sugar. I took long series of *Aplecta herbida*, *A. rubricosa*, *Gonophora derasa*, *Thyatira batis*, *Xylophasia hepatica*, *Euplexia lucipara*, one *Neuria saponariæ;* while commoner things were troublesome by their abundance. The weather was chilly and unsettled, rain being frequent. On returning to Reading, *Noctua rhomboidea* put in its first appearance at sugar on July 18th, and on the following day commenced emerging in the pupæ-box. In August I obtained a large number of this moth at sugar; the worn females were boxed, and, as a result I have many larvæ feeding on plantain and chickweed. My last winter's experience makes me hopeful of getting a considerable percentage into pupæ. I found, when low plants were difficult to obtain, *N. rhomboidea* made no objection to sliced potato as a substitute. On August 10th, I took three *Cosmia pyralina*, and on the 14th I had the pleasure of taking all the Cosmiæ, including two more *C. pyralina*. Sugar was the mode of capture, In all, eight *C. pyralina* were taken during the week, a number unprecedented, I believe, in this district in so short a time. This also establishes a new Reading locality for *C. pyralina*. Last week, in company with Mr. Holland, I had two fairly good nights; we took between fifty and sixty *Xanthia citrago* by sugaring limes, and also had the good fortune to add *Charæas graminis* to the already long Reading list. Saturday I tried for *X. aurago* at Henley, but failed; sugar did not draw. It was also full early for *X. aurago*. I, however, got one *Stauropus fagi* larva by searching the beech after dark with my light.—J. Clarke; Reading, Sept. 15, 1891.

Agrotis ravida at Chinnor.—During the past season I have taken six specimens of this species at sugar, five of them on the hill-slopes and the other in my garden. In an entomological contemporary, the editor has recently referred to this species as being "exceedingly rare" of late years. Entomologists will therefore be probably interested in knowing that in 1888 I caught about sixty specimens at sugar in Essex. Specimens taken by me at that time have been distributed into many collections in the country.—A. J. Spiller; Chinnor.

Larvæ at Chinnor.—On Aug. 10th, I took a full-fed larva of *A. alni* in the High Street of Chinnor; it spun up in a piece of raspberry-cane. Subsequently I took a second specimen, which died. Of *Stauropus fagi*, I found four examples by hard beating. I visited a locality for *N. cucullina* at some distance, and took twenty-seven larvæ during a short afternoon's work. *A. aceris* larvæ have been plentiful on horse-chestnut trees; they are brought to me by boys, who dislodge the larvæ whilst throwing at the chestnuts. *Smerinthus ocellatus*, *S. populi*, *S. tiliæ*, and *Sphinx ligustri* all occurred as larvæ in my garden. On the beech, *D. coryli*, *H. prasinana*, *E. trilinearia*, *A. betularia*, *S. illustraria*, and *N. camelina* were fairly common; I reared three broods of this latter insect on apple, *B. consonaria* on birch, and a large number of *S. carpini* on raspberry in the garden. *E. lanestris* larvæ have been plentiful in confinement; they fed well on plum.—A. J. Spiller; Chinnor, Oxon.

Argynnis paphia var. valesina near Lynmouth.—While collecting near Lynmouth, at the beginning of this month, I took a specimen of the above variety. It was sadly battered, and was taken sunning itself on some brambles. Is it usual to find it in this part of the country?—Ernest B. Charles; Glen Lyn, Lynmouth, North Devon, Sept. 22, 1891.

A Day at Tuddenham.—On the 14th of August last I went, with Mr. MacLachlan and Mr. Albert Houghton, to Tuddenham, where I obtained between forty and fifty larvæ of *Dianthœcia irregularis* in a very short time. Full-grown larvæ of *Lithostege griseata* were abundant. We also secured five or six larvæ of *Heliothis dipsacea* on *Silene otites*, when looking for *Dianthœcia*, and a number of those of *Hecatera serena*. One very small larva of *Anticlea sinuata*, found on bedstraw, since grown into a beautiful creature, I was especially pleased to get, as I had not seen the caterpillar of this species before.—Geo. T. Porritt; Greenfield House, Huddersfield. [The very different experience Mr. Porritt and myself had at Tuddenham (*vide* Entom. 221) is, perhaps, only what might be expected, seeing how diverse the conditions were under which we respectively worked. Where such a course is practicable, it would be well to secure the services of a local collector, when we have but a day to devote to any noted locality, which, to us, may be *terra incognita*.—Ed.]

OXYCERA TERMINATA, &c.—I see (Entom. 203) Mr. Billups records the capture of two species of *Oxycera terminata* at Oxshott. May I refer him to Entom. xxii. 84. Both my father and myself have taken it at Glanvilles Wootton and Lyme Regis as long ago as June 1st, 1830, and June 10th, 1865. It is quite true Mr. Verrall has placed it at the end of his list as reputed British, but I possess other species in the same predicament. I am rather surprised to find that *Oxyphora arnicæ* is considered to be a rarity, as I have always considered it to be otherwise, and found it so. Another little known species, *Tephritis plantaginis*, is common in July on the flowers of *Statice limonium*. I have both sexes of *Oxycera morrisii*, Curt., although Mr. Brunetti states, "The male is still unknown" (see Entom. xxii. 85).—C. W. DALE; Glanvilles Wootton.

HYPODERMA BOVIS, *Deg.*—A fine male of this very curious Dipteron was captured by myself while sweeping herbage near the powder magazine at Plumstead Marshes, on the 29th of July last. I was much struck by the very sluggish movements of the creature while in the net, the more so as Mr. Verrall informs me its flight is very rapid, and it is very difficult to catch. As the imago of this species is rarely seen on the wing, I thought the record of its capture might be interesting.—T. R. BILLUPS; 20, Swiss Villas, Copelstone Road, Peckham.

SIREX GIGAS IN IRELAND.—This insect is plentiful here this season. The larvæ are found at the end of borings which penetrate the trunks, roots, and branches of the silver-fir. The trees attacked were blown down some four or five years ago. The perfect insects may be seen at the end of the burrows with their heads protruding therefrom, and I secured several by the simple process of extracting them from the holes by means of a pin. To give some idea of the abundance of the insect in this place, I may mention that one stump of silver-fir, which I blew up with blasting-powder, contained hundreds of larvæ and pupæ of *S. gigas.*—J. H. LEECH; Kippure Park, Manor Kilbride, near Dublin, Sept. 10, 1891.

SIREX GIGAS IN NOTTS.—On August 1st, a fine specimen of *S. gigas* was taken here, in a chemist's shop, and presented to me. I have taken *S. juvencus* twice in the neighbourhood, and *S. gigas* occurs with fair regularity, though never commonly. The present specimen is the largest I have ever seen. It is a female, and in fine condition.—E. G. ALDERSON; Worksop.

SIREX GIGAS AT YORK.—I have had several specimens of this insect brought to me during the past few weeks, and all were in good condition.—W. HEWETT; 12, Howard Street, Fulford Road, York, Sept. 19, 1891.

SIREX JUVENCUS NEAR YORK.—A fine specimen of this somewhat rare insect was taken at Heslington, near York, on the 2nd September, whilst at rest on a chrysanthemum flower. It is now in my possession. Some seventy years ago this species occurred commonly on the towers of York Minster, and was locally known as "The Minster Fly"; but they entirely disappeared after the Minster was set on fire by Jonathan Martin, February, 1829.—W. HEWETT.

THE LOCUST (ACRIDIUM PEREGRINUM).—On my landing at Tangier early on the morning of June 3rd (for a brief stay of from three to four hours in Morocco, prior to the French Transatlantic Steamer, in which I had embarked from Cadiz, leaving at or about midday for Gibraltar), I took a walk through the town and its fertile outskirts on the high ground in the rear, ever and anon picking up a lifeless specimen of *Acridium peregrinum* by the side of the road, or in the hedgerow, relics of the recent plague of those insects, which had wrought such enormous damage to the early crops, and had been gradually disappearing since Tuesday, May 26th, about eight days previous. I likewise managed to secure two living specimens, a male and female, in a vineyard; the body of a freshly caught male is of a beautiful tint, a bright daffodil yellow. Many of the dead ones that lay strewn about were in a very dry and dilapidated state, the head being missing, or the wings and legs loose. According to a Gibraltar newspaper, a cloud of these insects had settled on a steamer during its voyage from Marseilles to Tangier, filling the cabins and saloon, and covering the deck to a depth of four inches, and it took the sailors some hours to clear them away. On inquiring of Mohammed, the Moorish guide, attached to the Hotel Continental, who accompanied another English gentleman and myself in our early walk, as to whether a change of weather had contributed to their destruction, "God killed them," he emphatically replied. According to the statement of some, the millions of locusts in Morocco this season have exceeded in number even those that have devastated Algiers. Such was my first experience of the locust of the plague of Egypt.— F. A. Walker; Dun Mallard, Cricklewood, N.W.

Errata.—Page 213, line 2, for "*P. stea*" read "*P. itea*"; line 10 from bottom, for "relects" read "relics."

SOCIETIES.

Entomological Society of London.—*September 2nd*, 1891. — Mr. Frederick DuCane Godman, M.A., F.R.S., President, in the chair. Mr. W. H. Blaber, of Groombridge, Sussex; Mr. T. D. A. Cockerell, F.Z.S., of Kingston, Jamaica; Mr. R. E. F. Hanson, B.A., of Tunbridge Wells, Kent; and Mr. R. C. Wroughton, of Poona, India, were elected Fellows of the Society. Mr. G. F. Scott-Elliot exhibited a series of various species of Diptera collected on Ranunculaceæ, Papaveraceæ, and Cruciferæ. He said that during the past summer he had studied about forty species of plants belonging to the orders named, and that they had all been visited by insects which were probably necessary for nectariferous flowers. The majority of the Diptera caught were not confined to one species or even genus, but in view of the unmodified character of the flower in the orders named this was only to be expected. Mr. Verrall observed that certain insects affected certain plants, but that the Geraniaceæ were seldom visited. The discussion was continued by Mr. M'Lachlan, Mr. Kirby, and others. Mr. W. L. Distant exhibited a specimen of the orthopterous insect *Hemisaga hastata*, de Sauss., which, in the Transvaal, he observed to attack and feed on *Danais chrysippus*, a butterfly well known from its protective character and distasteful qualities to have a complete immunity from the usual lepidopteral enemies. The *Hemisaga* lurked amongst the tops of tall flowering grasses, being consequently disguised by its protective resemblance to the same, and seized the *Danais* as it settled on the bloom. From close watching and observation Mr. Distant could discover no other danger to the life of this well-known and highly protected butterfly. Mr.

T. R. Billups exhibited four species of Diptera, which he believed to be respectively *Oxycera terminata*, Meg., *Pipizella annulata*, Meg., *Clidogastra punctipes*, Meg., and *Oxyphora arnicæ*, L., taken at Oxshott, Surrey, on the 11th July last. He mentioned that all of them were recorded in Mr. Verrall's list only as "reputed British." He also exhibited a specimen of *Hypoderma bovis*, Deg., taken at Plumstead on the 29th July last. Dr. D. Sharp exhibited several species of Forficulidæ, and called attention to the diverse conditions of the parts representing the wings in the apterous forms. Mr. H. Goss exhibited living larvæ of *Scoria dealbata*, reared from ova. They were feeding on *Polygonum aviculare*, but not very freely; *Brachypodium sylvaticum* had been named as a food-plant for this species, but he did not find that the larvæ would eat this or any other grass. The Rev. Dr. Walker exhibited, and read notes on, a collection of Lepidoptera, Hymenoptera, Coleoptera, Neuroptera, and Diptera, which he had recently made in Norway. Mr. Champion, Mr. Billups, and Mr. M‘Lachlan took part in the discussion which ensued.—H. Goss, *Hon. Sec.*

South London Entomological and Natural History Society.—*August 27th*, 1891.—The President in the chair. Mr. Tugwell exhibited a series of *Bryophila perla*, Fb., from Kent, showing great variation, those from Deal being the orange form; and particular attention was called to some specimens collected by Mr. Austin at Folkestone, in which the usual white colour of the wings was replaced by a dark greenish shade. Mr. Tugwell also exhibited, on behalf of Mr. J. E. Robson, of Hartlepool, *Lycæna astrarche*, Bgstr., collected at Durham, and showing the species in all its forms—vars. *salmacis*, St., and *artaxerxes*, Fab., with intermediate forms. Mr. S. Edwards, the genus *Charaxes;* and read notes on the distribution of the species, and descriptions of the larvæ and pupæ. Mr. J. H. Carpenter, under sides of *Thecla rubi*, L., bred from pupæ, and being strongly marked with white spots; he also showed *Eugonia quercinaria*, Hufn., bred from ova, which were unusually dark. Mr. Frohawk, *Pieris napi*, L., from different localities, and three females showing gradations in the formation of an additional spot between the third and fourth nervules; one male entirely white; pale and dusky forms of the female; and a banded form of *Pararge megæra*, L., taken at Chattenden, 1861. Mr. Mera, living larvæ of *Acronycta tridens*, Schiff. Mr. West (Streatham), the Lewes form of *Gnophos obscuraria*, Hb.; also an example of *Nænia typica*, with two tibiæ and tarsi on the left front femur. Mr. Turner, bred series of *Pelurgia comitata*, L., and of *Hypsipetes sordidata*, Fb., the latter showing red, pale, dark, and banded forms; he stated that the larvæ had been fed on a mixed diet. Mr. Turner also exhibited a living larva of *Stauropus fagi*, L. Mr. C. Fenn, *Odontia dentalis*, Schiff. (bred from *Echium*), *Hyria muricata*, Hufn., *Anerastia lotella*, Hb., *Crambus uliginosellus*, Zell., *C. contaminellus*, Hb., and *Sericoris conchana*, Hb., from Deal and neighbourhood. Mr. H. A. Sauzé, a case of Coleoptera, containing twenty-six species. Mr. Billups, British Diptera, including *Nemoræa strenua*, Meig., from Oxshott, *Eristalis sepulchralis*, L., a male, taken at Plumstead; also a female of the rare *Hypoderma bovis*, Deg., *Phytomyza aquilegiæ*, Hardy, reared with its parasite *Rhizarcha areolaris*, Nees, from leaves of the columbine growing in his garden at Peckham. Mr. Billups also exhibited *Polysphincta varipes*, Gr., and a cocoon of *Attacus cecropia* from New York State, received from Mr. Turner, and from which he had bred forty-eight specimens of a species of *Cryptus*, closely allied to the British *Cryptus digitatus*, Gmel.

September 10*th.*—The President in the chair. Mr. W. F. Robinson, of Notting Hill, was elected a member. Mr. S. G. C. Russell exhibited a large number of *Argynnis selene*, Schiff., from North Hants localities. Mr. Carpenter, a fine series of *Pericallia syringaria*, L., bred from ova received from Essex; and of *Dianthœcia albimacula*, Bork., bred from larvæ obtained in Kent. Mr. Frohawk, a series of *Polyommatus phlœas*, L., and pointed out the advantage of rearing this species from ova, as those bred were much larger than captured specimens. Mr. Joy, a melanic specimen of *Boarmia repandata*, L., taken at Hampsfelt, near Grange. Mr. Tugwell remarked that it was the same form as that which Mr. Porritt got in his district, and, in reply to Mr. Tutt (who stated that Mr. Porritt obtained his black examples of this species from a very dark fir-wood, and inquired whether the locality from which the specimen now exhibited came answered this description), Mr. Joy said he took it on the trunk of a larch tree on the edge of a larch plantation, which was not at all dark, the specimen being very conspicuous on the tree-trunk. Mr. R. Adkin showed a series of *Psodos coracina*, Esp., bred this spring, from Rannoch, and he pointed out that in some of the examples the band was cut right through. Mr. C. Fenn, about fifty caught specimens of *Agrotis corticea*, Hb., showing the variation of the species at Deal. Mr. Tugwell and Mr. Jenner Weir remarked that many of the specimens ran extremely close to *A. cinerea*, Hb. Mr. Barker exhibited a dark variety of *Arctia caia*, L., and Mr. Weir remarked that he had once seen a series arranged according to whether the antennæ were white or blackish, and he thought it would be of interest if members would look at the antennæ of their specimens of this insect. Mr. Short exhibited varieties of *Arctia caia*, L.; in one example the white markings of half of the superior wings were absent. Mr. Short called attention to the fact that the ordinary cream marking of many of the specimens he exhibited was strongly tinged with a rosy colour. Mr. Tugwell showed examples of *Melitæa aurinia*, Rott., from English, Irish, and Scotch localities, and made some observations on the local variation of this species; a discussion ensued.—H. W. Barker, *Hon. Sec.*

Lancashire and Cheshire Entomological Society.—*Sept.* 14*th*, 1891.—The opening meeting for the winter session. S. J. Capper, F.L.S., F.E.S., in the chair. Mr. C. H. H. Walker read a paper on "Nerves and Nervous Systems," describing the general structure of the nervous system of a typical insect and comparing it with that of a spider, and pointing out the close affinity, which differs only when the economy of the subject rendered it necessary. The paper was illustrated with carefully executed black-board drawings. Among the numerous exhibits, the president showed specimens of the new *Tortrix donelana* from Galway. Mr. Walker, curious varieties of *Vanessa antiopa*, which he had bred from Canada, the black subterminal band and the blue spots being quite absent, and the yellow border very wide. Mr. Melville, a fine specimen of *Chœrocampa nerii*, captured at Prestwich in 1846. Mr. Newstead, several cases of life-histories, including the full history of *Sirex gigas*, which he stated had been very common this year. Mr. Prince, a fine variety of *Arctia caia*, bred by him this year, the fore wings of which were almost quite brown, and the black spots on the hind wings formed a thick dark marginal band. Mr. Gregson, a series of *Lithosia sericea*, taken this season. Mr. Harker, *Dianthœcia barrettii* from Howth.—F. N. Pierce, *Hon. Sec.*

Birmingham Entomological Society.—*August 17th*, 1891.—Mr. R. C. Bradley in the chair. Mr. G. W. Wynn showed bred series of *Bombyx rubi* and *B. quercus* from Sutton; a single specimen of *Chærocampa porcellus*, taken at Sutton last June; a series of *Notodonta dictæa*, bred from larvæ found on Cannock Chase; and a single specimen of *Plusia bractea* from Bewdley. Mr. P. W. Abbott, large series of *Zygæna filipendulæ* and *Z. trifolii* from the Isle of Wight, including yellow varieties of the former species; of the latter species, quite 75 per cent. of the specimens taken were varieties, with the spots more or less coalesced. Mr. R. C. Bradley, *Scatophaga scybalaria* from Sutton Park. Mr. C. J. Wainwright, *Phytometra ænea* from Wyre Forest.—C. J. Wainwright, *Hon. Sec.*

OBITUARY.

E. W. Janson.—A well-known member of the entomological fraternity will be missed in Edward Wesley Janson, who died at his residence in Stroud Green on the 14th of last month (August). He was born at Hackney on the 14th March, 1822, and was therefore in his seventieth year. He received his education at the college of La Flèche, in France, and subsequently studied for the medical profession at Edinburgh, but relinquished the career at his father's wish, in order to assist him in his business as Dutch merchant in the city, and afterwards as secretary of the Dutch-Rhenish Railway. On the death of his father, in 1867, he commenced business as a natural-history agent, publisher, and bookseller, in which he continued until compelled by failing health to retire in February last. Like all true naturalists, his taste for this pursuit was innate and declared itself at an early date. He began as a collector, and his happy hunting-grounds were the then little-frequented Highgate Woods and Hampstead Heath, in the neighbourhood of his father's residence. His speciality was Coleoptera, and he soon became not only a skilful and successful collector, but a scientific authority on the British species, much respected by his colleagues. In the course of time he extended his studies to the products of the whole world, beginning with the Staphylinidæ, and afterwards taking up the Elateridæ, his collection of which ultimately became the largest ever known. As an author he was almost painfully accurate and laborious, and, on this account probably, published but little. He wrote the Coleopterous portion of the 'Entomologist's Annual' from its commencement in 1855 to 1861, and contributed also several papers on ants'-nest beetles. He compiled the descriptive part of the Coleoptera of the edition of Curtis's 'British Entomology' published in 1863; wrote various papers in the 'Zoologist' and 'Transactions of the Entomological Society'; edited one of the English editions of Figuier's 'Insect World'; and lastly, in 1882, contributed a paper to the 'Cistula Entomologica' on the Elateridæ collected by Buckley. For many years he filled the post of Secretary and Librarian to the Entomological Society, of which he had been a member since 1843. Among the scientific property he leaves behind him are his matchless collection of the Elateridæ and allied families, and a library of great extent and value. His collection of British Coleoptera was ceded many years ago to Mr. G. R. Crotch, and now forms part of the University Museum at Cambridge.

THE ENTOMOLOGIST.

VOL. XXIV.] NOVEMBER, 1891. [No. 342.

TORTRIX DONELANA, CARPENTER.

FOR several months past the occurrence of a supposed new species of the genus *Tortrix* has been an open secret among entomologists in this country, but very little information concerning it has so far found its way into our entomological journals. The following abstract of a paper entitled "A new Species of *Tortrix* from Tuam," by George H. Carpenter, B.Sc., Assistant Naturalist in the Science and Art Museum, Dublin,* may therefore be interesting to readers of the 'Entomologist':—

Early in June of last year (1890) Mr. D. O'C. Donelan, of Sylan, Tuam, forwarded to me some pine-shoots, with small caterpillars, which, he stated, had caused much damage, in the summers of 1889 and 1890, to a plantation of firs situated partly on bog and partly on upland tracts. Some of the caterpillars pupated very soon after arrival. About the middle of July three moths (all males) appeared, and my surprise was great to find that they very closely resembled *Tortrix viburnana*.

It appears to be identical with the moth figured in Herrich-Schäffer's 'Schmetterlinge von Europa,' vol. iv. fig. 419, as a variety of *Tortrix steineriana*, Schiff. This figure, however, is very unlike the true *T. steineriana* (*op. cit.* vol. iv. figs. 57–8), and the author, in his Appendix (*op. cit.* vol. vi. p. 155), expresses his opinion that it is a distinct form. Heinemann ('Die Schmetterlinge Deutschlands und der Schweiz,' vol. ii. p. 46) identifies this figure of Herrich-Schäffer's with the *Tortrix lusana* of that author; but neither the figure nor my specimens agree with this opinion. Besides, the larva of *T. lusana* is stated by Heinemann to feed on *Vaccinium*.

We may therefore conclude that, except for Herrich-Schäffer's unnamed figure, the moth from Tuam is new to science. I have much pleasure in describing it under the name of *Tortrix donelana*, as a tribute to the gentleman who discovered it.

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* 'Scientific Proceedings of the Royal Dublin Society,' vol. vii. pt. ii. p. 91, pl. vii. (1891).

Tortrix donelana, sp. nov.

Imago.—The expanse of the wings varies from 17 to 20 mm. The costa of the fore wing is well arched at the base, and then runs straight to the tip, which is rather pointed. The hind margin is very slightly convex, except at the anal angle. The ground colour of the fore wings is yellowish brown, with a bronzy appearance, which in certain lights gives them an olive-green sheen. Near the tip of the fore wing is a brown costal spot, and an oblique irregular brown band crosses the wing from the middle of the costa to the anal angle. A few thin, brown, curved lines run from the costa towards the inner margin, between the oblique band and the hind margin, towards which their convexity is directed. The distinctness of all these brown markings varies greatly, as the fore wings of one of my specimens appear almost unicolorous yellowish brown, with a bronzy lustre, much resembling *T. viburnana.* The hind wings have the hind margins decidedly concave below the tip; their upper surface is dark grey. The fringe is silvery white. Beneath, the fore wings are blackish, and the hind wings whitish grey. The labial palps are of moderate length, and, together with the head and thorax, are covered with brown scales, those on the thorax being darkest. The abdomen is *short, hardly reaching the anal angle of the hind wing.* It is clothed with dark grey scales, and the anal tuft is light yellow.

Larva.—The larva is of the ordinary *Tortrix* type. It is olive-green dorsally, yellow laterally, and yellowish green ventrally, with dorsal and lateral rows of yellowish white spots, from which spring blackish hairs. Its length is 11 or 12 mm. The head and the posterior part of the last abdominal segment are yellowish brown, marked with black.

Pupa.—The pupa is brownish black. Each of the abdominal segments (except the first and the last) is provided with two half rings of spines, by means of which the pupa can move in its cocoon.

Habitat.—Tuam, Co. Galway, Ireland.

Time of appearance.—Larva: April to July. Pupa: June and July. Imago: July and August.

Food-plants.—Scotch fir and larch.

Habits.—The larva feeds on the pine-shoots, which it seems to almost divest of their leaves. Mr. Donelan writes:—"The caterpillar appears in two or three different ways. It fastens together two shoots, and forms a nest of web; when disturbed it creeps out at the top, and, falling to the ground, tries to hide in the heath, &c.; or some of the pine leaves are fastened together on a single shoot, and the nest of web is formed within. Sometimes a few of the caterpillars are found on the shoots without any covering; this generally happens later in the season than the former." The cocoon in which the pupa is contained appears to be formed by the closing up of the web in which the larva had sheltered. The cocoon is surrounded by a mass of scale-leaves.

It seems very strange that this apparently unnoticed insect should have made its appearance in such numbers as to force attention by its damage to plantations. Mr. Donelan, who has had considerable experience of pine-woods, says it is the worst pest he has seen in Ireland. Equally strange is its occurrence in such a remote district of the British Isles as Co. Galway.

Mr. Donelan tells me that the young trees on which the larvæ were found came from Scotland, and may have been originally imported from the Continent. Hence, if the identification of *T. donelana* with Herrich-

Schäffer's figure be correct, we may have here an insect so rare on the Continent as to have escaped observation as a pine-feeder (no mention whatever is made of it in Kaltenbach's 'Pflanzenfeinde' or Ratzeburg's 'Forst-Insekten'), but which, imported to the West of Ireland, found there so favourable an environment as to become a dominant member of the insect fauna. The fact that all the modern fir-trees of Ireland have been imported (Moore and More, 'Cybele Hibernica,' p. 151) makes the importation of the insect highly probable.

On the other hand, may it be possible that we have had lately developed in our islands a really new species, an offshoot of *T. viburnana*, which for some unknown reason has changed its food-plant? If this view be accepted, we must give up the identification of *T. donelana* with Herrich-Schäffer's figure.

Mr. Adkin has been good enough to lend me a pair of this insect, which he bred from a larva and pupa received from Ireland in the early part of July this year. Examination of these specimens, and careful comparison with a long series of *Tortrix viburnana*, enables me to support Mr. Barrett's opinion that *donelana* is not separable from *T. viburnana*.

It is stated that *donelana* varies in the marking of the fore wings, and one of Mr. Carpenter's specimens resembles ordinary *viburnana* so closely that it would probably be difficult to point out any material difference. The abdomen of the type of *donelana* is described as "short, hardly reaching the anal angle of the hind wing." As this is the only portion of the description which is italicised, some importance would appear to be attached to it; but in the male specimen bred by Mr. Adkin the abdomen is quite of the length usual in *T. viburnana*, i. e., it extends a little beyond the anal angle. The anal tuft of *donelana* is said to be light yellow; some specimens of *viburnana* have the tuft yellowish, others greyish, and in others again it is brownish. With regard to the marking on fore wing, Mr. Adkin's male example of *donelana* differs from the type, as described and figured by Mr. Carpenter, in having a basal patch and broad internally angulated marginal band of the same colour as the central fascia; I have a specimen of *viburnana*, taken on the Yorkshire moors, which is marked very much in the same way.

Mr. Carpenter refers to the male only. The female example bred by Mr. Adkin from the larva, adverted to, is small, but I should have pronounced it to be a female *T. viburnana*, if it had been sent to me for identification; with the exception of its lesser size, it is almost identical with a specimen I have from the Warren at Folkestone.

Some entomologists would seem to consider this fir-feeding *Tortrix* identical with *T. steineriana*, Hüb., var. *dohrniana*, H.-S., but whether it is so or not I cannot say, as I have not the necessary material at hand to enable me to form an opinion. I certainly have a single continental specimen ticketed *dohrniana*, but this is exactly identical with certain British *viburnana*, which are probably not very unlike the specimen of *donelana* resembling *viburnana* referred to by Mr. Carpenter.

RICHARD SOUTH.

THE DIAMOND-BACK MOTH (*PLUTELLA CRUCIFERARUM*).

By J. ARKLE.

ALTHOUGH the year 1891 has not been marked by the appearance of attractive and welcome insects, such as *Colias edusa* or *Deilephila galii*, it may be handed down to entomological posterity as celebrated for the occurrence of a moth which, if diminutive in size, brought itself into prominent notice by its pestiferous abundance. Happily, it may be added, many entomologists, at any rate in western Britain, are unacquainted with this little turnip moth, which has shown a power, during the past summer months, to work destruction from the shores of the Forth to those of The Wash. It is the *Cerostoma xylostella* of Curtis—not, it may be observed, the beautiful hook-tipped *C. xylostella* of Stainton—the *Harpipteryx xylostella* of South! In the genus *Cerostoma*, Stainton describes the pupa as being enclosed in a close, firm cocoon; while, as we consider this matter of synonyms, it is worth noting that his adopted *Plutella* is distinguished by a cocoon of open network. Mr. South also adopts *Plutella* in his 'Synonymic List,' and, in common with Stainton, he uses the appropriate specific name of *cruciferarum*.

Although this insect-pest occurs more or less, year after year, in the infected districts, the question naturally arises—What is the reason of its extraordinary abundance this season? Possibly it may be as mysterious an apparition as *C. edusa* or *D. galii*—or the advantages in aid of hybernation may have been exceptional during the winter—or it may have come to us from across the sea! The migratory, or blown-over, theory may receive some support from the following story, which I take from 'The Liverpool Daily Post' for Aug. 15th:—"Mr. H. A. Paynter, solicitor, Alnwick, told Mr. Raynard, Inspector of the Board of Agriculture, that, being requested by Lord Walsingham to try and get him some moths, he (Mr. Paynter) proceeded, on July 10th, to the Longstone Lighthouse, on the Farne Islands, where he found the rocks close to the lighthouse covered with them. On questioning the three lighthouse-keepers upon this remarkable occurrence, they informed him that such a great cloud of moths was driven over by the north-east wind that they were obliged to keep sweeping them off the lantern throughout the whole night in order to allow the light to be seen at sea." The paragraph then goes on to say that "this statement made by the lighthouse-keepers would conclusively prove (?)—the query is mine—that there had been a large importation of these moths from abroad, as in most cases the outbreak of the caterpillar occurred soon after that date."

Not only, however, has this insect-pest been conspicuous for its abundance on this side of the globe, but, according to 'The Cheshire Observer' for Oct. 10th, it "has also done an immense amount of harm this year to the turnip crops in New Zealand and Tasmania." The migratory, or blown-over, theory must therefore credit this insect-speck with an organisation which enables it to continue on the wing for 400 or even 1000 miles, or to sail such distances on the wings of the wind.

Leaving this problematic part of the subject, let me say I obtained almost full-fed larvæ of *P. cruciferarum* from Northumberland, Durham, and Yorkshire in the first week of August. With Lincolnshire I was unsuccessful, as my correspondent there happened to be from home, and the larvæ had disappeared before his return.

Some of the readers of the 'Entomologist' may be interested to know that the caterpillar—dorsally and underneath, legs and claspers—is pea-green. In some specimens there were indications of a dorsal, and on each side a subdorsal, stripe of a deeper green. The head is pale green, faintly tinted with purple, and ornamented with minute black spots. This description also applies to the second segment. Each segment has a couple of rings of minute tubercles, and each tubercle emits a short black hair or bristle. The anal claspers are considerably porrected, or stretched out behind, and they give a very bifurcated appearance to the termination of the caterpillar. Such is the aspect under a strong magnifying-glass. To the unassisted eye it is simply a short green caterpillar, five-twelfths (nearly half an inch) long, and tapering at both ends. It feeds on turnips, cabbages, cauliflowers, and, as Stainton observes, "other Cruciferæ." It is very partial to the under sides of the leaves, and falls off the food-plant on being disturbed, or wriggles about and away, either head or tail first, after the manner of *Tortrix* larvæ. When shaken off its food-plant it generally suspends itself by a silken thread, by means of which it can speedily return.

My caterpillars began to pupate on the 11th of August. At first the chrysalis is pale green, but changes in a few hours to light grey, with smoke-coloured streaks, visible to the naked eye. The pupa is a quarter of an inch long, and can be easily seen through the spindle-shaped cocoon of open network, which is fastened either to the upper or under side of a leaf. The caterpillars showed a marked preference, in spinning up, for the gauze covering of the flower-pot. Under a good magnifying-glass the cocoon appears to be made of whitish silken ropes, arranged in irregular meshes across the chrysalis, which, with its smoky markings, is very distinctly seen.

The moths began to appear on August 23rd, and had all emerged by Sept. 13th. In size and general coloration they strongly resemble the ordinary clothes' moths. The following description is obtained through the medium of a strong magnifier:—Antennæ long, slate-coloured, and spotted with white. The palpi are very conspicuous, brown, and porrected. The head and thorax are the same general brown colour of the upper wings. The body is a silvery dark grey or slate-colour, the segmental divisions light grey spotted with white, and there is a conspicuous anal tuft of silvery grey. The fore wings are narrow, brown, and spotted with black, especially at the outer margins, where the spots chiefly form two parallel lines. Extending along the inner margin, and nearly its entire length, is a long dash or stripe of very light brown, or, as in many examples, of light ochreous-colour. This stripe is broad (about one-third of the wing-breadth), and has three angular "projections" stretching into the dark brown colour of the wing; these projections are bounded by a thin line of pale shining ochreous-colour, or, as in frequent specimens, of white. The whole of the wing-surface is dotted irregularly with minute black spots, the middle area is very dark brown; in some specimens it is almost black; the inner marginal stripe is then much paler, and the wing, especially the costal margin, dusted with white scales. When the wings are closed the projections of light colour assume a diamond pattern: with good eyesight this pattern is visible, especially in the dark specimens. The lower wings are a silvery slaty grey, with long marginal fringes of the same shade.

Before considering what the agriculturist can effect in necessary war against this insect-pest, it is interesting to observe what Nature provides for its suppression. Probably no living creature has a harder time of it than our insect of the diamond-back. Should it appear even in thousands, so apparently does the deadly ichneumon: at least one-half of my larvæ, especially those from Durham and Yorkshire, were so infected. If the two species of ichneumons I bred are peculiar to *P. cruciferarum*, how then did *their* extraordinary abundance arise? Were their progenitors already in anticipation on British shores, or did they follow the cloud of moths to the lonely rocks and lighthouse of the Farne Islands? No record appears on this latter point from the three keepers. These ichneumons are so pretty and so interesting that I venture to describe them as below:—

(1). The most abundant. Size, that of the moth, or nearly so. Head, thorax, and body black. Antennæ the length of the body, stout, smooth, and curved upwards. Wings rounded and transparent, nervures black. The wings reflect the most beautiful rainbow colours, chiefly pink, purple, and pale green. Legs russet-brown. The ovipositor is black and simple; it is attached *to a plate* underneath the abdomen, and near its termination; it is blunt, and shaped like a cavalry sword with a curve upwards. All this, however, is only the sheath; this sheath is composed of two halves, which open at the base, like the arms of the letter V. Between these arms is the real ovipositor, brown, polished, and pointed. I was able to examine the real ovipositor only by drying the insects; the muscles controlling the sheath were then contracted, the sheath opened and the ovipositor was exposed.*

(2). Much less abundant than No. 1. Same size. Head, thorax, and body black; under side of body yellowish green. Legs russet-brown. Long black antennæ the length of the body and curving upwards, not smooth, but knotted. Wings transparent, nervures black, not so rounded as in No. 1. The wings reflect the same beautiful tints, chiefly pale green. The ovipositor is shaped like a small y, the right arm of the letter being at least twice the length of the other; it is attached under the abdomen, as in No. 1, but by each of the arms.

The moth emerges at one end of the cocoon, leaving hardly a trace of exit; the ichneumon saws an ugly round hole through it near the end.

Such is a description of some of Nature's agents, and in their operations lies apparently an exhibition of Nature's plan. The ichneumons, the birds, the climatic helps, only clear off a portion of these pests. Man is evidently expected to investigate, to help himself, and to look upon these natural aids as allies. Looking through the letters of my correspondents, I find that, where the birds were properly looked after, *P. cruciferarum* has been least hurtful. On the other hand, where the birds have been decimated, there the scourge has apparently been most conspicuous. As an illustration, a correspondent from "an anti-rook and bird district" speaks of "whole fields having been stripped" by the caterpillar, and of such spectacles as "nearly a dozen crows and a sparrowhawk nailed to a tree through the head."

Sometimes the diamond-back is eccentric in its ravages. A twenty-four acre field in Lincolnshire, where, by the way, the Act for the Preservation of Birds is strictly enforced, had eleven acres white turnips and the remainder swedes. "The whites," says my correspondent, "were entirely ruined, but the swedes were untouched. As soon as the pest was discovered the crop was ploughed in," rape or late globes, I suppose, being afterwards sown.

Passing by compensation from the State for reasonable loss as a matter more for the agriculturist and the politician, the following remedies from my own correspondents may be offered as matters of greater interest to the entomologist:—

(1). Fields should be kept clear of cruciferous weeds, such as the well-known yellow-flowering "kale"; fences, refuse-heaps, headings, and vacant spaces should not be forgotten. (If I remember rightly, Miss Ormerod prescribed this, long ago, in her admirable book on Injurious Insects).

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* Doubtless *Limneria gracilis*, Grav.—E. A. F.

(2). The crop should be destroyed (ploughed in) upon the first appearance of the caterpillar.

(3). Insecticides, whether in liquid or powdered form, appear to be, in this case, of very doubtful value; they are expensive, and liable to be washed off by the first shower of rain. Besides, the caterpillars are often on the under sides of the leaves. In short, while Nature's battalions may be depended upon to make the attack in force, man's part would seem to lie more in the cutting off of supplies.

Chester, October 12, 1891.

CAPTURES AT THE ELECTRIC LIGHT.

By Robert Adkin, F.E.S.

On the 8th of September last I visited the Royal Naval Exhibition at Chelsea. The day was hot, and the evening one of the few that we have been favoured with during the past summer, when one could sit out-of-doors with impunity. By eight o'clock darkness had set in, and the powerful electric arc-lamps, by which the grounds are illuminated, having been turned on, I fully expected to see moths circling round them in some numbers; but to my surprise they were conspicuous by their absence, and during an hour that I was walking about the grounds only some two or three were seen. About nine o'clock I ascended the lighthouse, and on reaching the outer gallery surrounding the light my eye at once fell upon a moth sitting upon the glass, then another, and another, until upon further examination the place seemed alive with them; numbers were circling round in the air, others lay trampled under the feet of the crowd of people that were walking about the gallery, while others rested, apparently asleep, upon the glass; and this, too, under most adverse circumstances, for, although it appeared to be quite calm while walking on the ground, a gentle breeze was blowing at this elevation, and setting in a direct line from the chimneys of the tier of boilers used for driving the electric machinery, brought with it hot sulphurous fumes that made the air almost unbearable. The species that appeared to be most common were, as one might expect in such a locality, *Triphæna pronuba* and *Plusia gamma*, but, not being prepared with the necessary paraphernalia for an entomological expedition, I was unable to make any large number of captures. As, however, I happened to have three small boxes in my pocket, I filled them at random from the moths that were sitting on the glass; these, upon subsequent examination, proved to be *Drepana binaria*, *Plusia gamma*, and *Pionea forficalis*. One of the attendants, who happened to see me boxing them, volunteered the information, "Oh! do you want them things? There's plenty of them up here every night; great big 'uns, too, sometimes"; but unfortunately I could elicit no further information that would give me any clue as to what manner of moths the "big 'uns" might be. This lighthouse is, I believe, modelled on the same lines, as regards external appearance and size, as the original, which now stands upon' the Eddystone Rocks, and the light is of similar brilliancy; if that be so, the light is some hundred and thirty feet from the ground, and its capacity many times greater than the numerous lamps around it, which after my descent were as little frequented as they were earlier in the evening.

In a note on "Captures at the Electric Light" (*ante*, 243), Mr. T. E. Sansom points out that at Yokohama the powerful exposed lamps are very attractive to Lepidoptera, whereas the smaller lamps, although situated more directly in the position where the moths would be likely to fly about, seem to have no particular attraction for them. At a meeting of the Entomological Society of London, Canon Fowler mentioned that moths were attracted by an electric light fixed upon Lincoln Cathedral during the Jubilee illuminations, *Acronycta alni* and *Leiocampa dictæa*, which he exhibited, being among their number.

It will be noted that in two of the cases mentioned a comparison may be drawn between lights of greater and lesser brilliancy, and in each the more powerful lights drew many moths to them, whereas those of less power had little, if any, attraction for them; and in two also the lights were at a considerable elevation, but their height proved no obstacle to their attractiveness. The inference therefore appears to be that a light of high power placed in an exposed position is likely to draw the largest number of moths to it, even attracting them from less powerful lamps in its vicinity, and it would be interesting to note whether this rule holds good in all cases where a comparison between two or more lights, or sets of lights, of unequal power and position is practicable.

Lewisham, October, 1891.

ADDITIONAL NOTES ON THE ENTOMOLOGY OF OXSHOTT.

By T. R. Billups, F.E.S.

Among the unidentified species of Hymenoptera-Aculeata, &c., referred to by me, *ante*, p. 202, were *Priocnemis hyalinatus*, Fab.; *Pompilus spissus*, Schiödte (this species was very plentiful); *Trypoxylon clavicerum*, St. Farg., *Crabro palmarius*, Schreb., several males of which were taken; and *Andrena fuscipes*, Kirby. The latter was common on *Erica*, &c.

Ichneumonidæ.—Two specimens of *Agrothereutes hopei*, Gr., and one of *Pezomachus bellicosus*, Foerst., were taken by sweeping clover. *Anomalon cerinops*, Gr., *Campoplex oxyacanthæ*, Boie, *Nemeritis macrocentra*, Gr., and *Banchus moniliatus*, Gr.; a single specimen of each was captured. Two specimens each of *Tryphon trochanteratus*, Holmgr., and *Thersilochus jocator*, Fab., with a solitary female of *Polyblastus pinguis*, Gr., complete the list of Ichneumonidæ proper. The Braconidæ having representatives in *Meteorus ictericus*, Nees, *Chasmodon apterus*, Nees, *Alysia manducator*, Panz., *Dapsilarthra apii*, Cur., and *Cœlinius niger*, Nees, a single type of each being taken. *Megaspilus fuscipes*, Nees, *Helorus anomalipes*, Panz., and *Spilomicrus nigriclavis*, Marsh., representing the Oxyura. The additions to the Tenthredinidæ were two females of the not common *Athalia lugens*, Ste., beaten from *Clematis vitalba;* a solitary female of *Nematus glutinosæ*, Cam.; and one of the uncommon *Pamphilius sylvaticus*, Klug. The subfamily, Anacharides, being represented by *Anacharis typica* and *eucharoides*, Walker.

Diptera.—Amongst those undetermined in my last paper are the following:—*Odontomyia viridula*, F., fairly common; *Leptis tringaria*, L.; *Pœcilobothrus nobilitatus*, L., very plentiful, hovering round a little running stream of water; two females of the very handsome *Cynomyia mortuorum*, L, were captured, but with some difficulty, their flight being very rapid; *Pollenia vespillo*, F., *Limnia obliterata*, F., and *Loxocera albiseta*, Schrk., was fairly numerous; the delicate little *Micropeza corrigiolata*, L., was abundant, but only to be taken with extreme caution, if one wished to have perfect specimens; *Trypeta serratula*, L., *Tephritis leontodontis*, Deg., and *Euaresta conjuncta*, were also captured, but seemed exceedingly scarce; *Lauxania ænea*, Fln., and *Parhydra coarcta*, Fln., complete my list of captures in Diptera.

Hemiptera.—The seventeen species taken were as follows:—Two specimens of the not common *Sehirus morio*, Lin.; *Derophysia foliacea*, Fall.; *Monanthia cardui*, Lin.; *Salda saltatoria*, L., this species was in numbers, jumping about in the short damp herbage; *Leptopterna dolobratus*, L., was very plentiful; *Lygus pratensis*, Fab., common; *Oncognathus binotatus*, Fieb., also common; *Ætorhinus angulatus*, Fieb., fairly plentiful; three specimens of *Globiceps flavomaculatus*, Fab., and two of *Cyrtorrhinus caricis*, Fall., were captured; while *Orthotylus nassatus*, Fab., and *Heterotoma merioptera*, Latr., were common on the nettles, &c.; *Psallus sanguineus*, Fab., was plentiful on some dwarf sallows; a small birch producing *Psallus roseus*, Fall.; while several specimens of *P. alnicola*, Dougl. & Scott, were beaten from alders; *Plagiognathus viridulus*, Fall., was very plentiful on nettles; and several specimens of *P. roseri*, H.-Scff., were taken on sallows.

Coleoptera.—Although some twenty-seven species were obtained, none of them are worthy of particular attention, and I simply enumerate the species taken. Among the Geodephaga, *Cicindela campestris*, L., was common, and, together with a single specimen of *Pterostichus cupreus*, L., were the only two representatives of this family. Among the Staphylinidæ were *Thiasophila angulata*, Er.; *Homalota atramentaria*, Gyll., and *H. fungi*, Gr.; *Bolitobius atricapillus*, F., *B. trinotatus*, Er., and *B. pygmæus*, F.; *Mycetoporus lucidus*, Er., *M. lepidus*, Gr.; and *Oxyporus rufus*, L.: all from fungus. *Stenus flavipes*, Steph., and *S. similis*, Hbst., were plentiful by sweeping. A dead rabbit producing *Choleva tristis*, Pz., and *C. chrysomeloides*, Pz., and also two specimens of *Hister cadaverinus*, E. H. *Coccinella hieroglyphica*, L., was very plentiful; a single specimen of *Geotrupes pyrenæus*, Charp, representing the Scarabæidæ. *Helodes livida*, F., was common, as also was *Malthinus fasciatus*, Fall., and *M. punctatus*, Fourc.; a single specimen of *Tillus elongatus*, L., was captured flying; several specimens of *Notoxus monoceros*, L., were taken; *Sitones lineatus*, L., was common, as also *Hypera polygoni*, L.; while *Bruchus cisti*, F., absolutely swarmed; and, lastly, *Cryptocephalus fulvus*, Goeze, was obtained commonly by sweeping low herbage. Very many other species might have been taken, but I was not on Coleoptera bent. The three Orthopterons are as follows:—*Gomphocerous rufus*, L., very common; *Tettix bipunctatus*, L., and *T. subulatus*, L.

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

By Arthur G. Butler, F.L.S., F.Z.S., &c.

(Continued from p. 242.)

Lithophane lambda.

Noctua lambda, Fabricius, Mant. p. 174 (1787).

Lithophane thaxteri, Grote (see Check List, p. 33, n. 783).

Europe and United States. Coll. B. M.

L. thaxteri is typical *L. lambda* = *rufescens*, Mén. The species in Europe varies considerably, both in the definition of the markings of the upper surface and the colouring of the under surface. The variety *L. somniculosa* = *lapponica* varies below from deep reddish to reddish buff; whereas the variety *L. zinckenii* is ochraceous, without a tinge of the red colouring.

L. contenta of Grote is extremely close to *L. lapidea* from Europe; but I am not satisfied that they are one and the same species, although the individuals of *L. lapidea* show considerable variation, both as regards pattern and depth of colour.

The Nolaphaninæ appear to me to be a superflous group. *Adipsophanes*, which is a synonym of *Catabena*, Walk., and

Crambodes, Guen., appear to me to be only slightly aberrant Leucaniidæ; whereas *Nolaphana* is much nearer to *Bryophila* in character, as already stated.

CATABENA, *Walk.*

Catabena lineolata.

Catabena lineolata, Walker, Lep. Het. Suppl. 2, p. 631 (1865).
Adipsophanes miscellus, Grote (see Check List, p. 33, n. 801).
United States. Coll. B. M.

The Xylininæ and Cucullinæ appear to me to be allied to *Xylophasia*. *Cucullia clausa* of Walker, which was without any register-label, and the locality of which was consequently unknown to Walker, appears to me to be a dwarfed and worn specimen of *Eucalimia absinthii* of Europe.

CALLÆNIA, *Hübn.*

This is quite distinct from *Cucullia*, the form, length, and style of coloration of the primaries being entirely different; the pattern and character of the larvæ also differ considerably.

Callænia lactucæ.

Noctua lactucæ, Schiffermüller, Wien. Verz. p. 74, n. 7.
Cucullia intermedia, Speyer (see Grote's Check List, p. 33, n. 796).
Europe and United States. Coll. B. M.

I can find absolutely no difference between specimens from Europe and North America. At first I thought that the New World insect had rather a longer costal margin, and consequently a more oblique outer margin to the primaries; but Grote's second specimen does not show this difference.

Xylina spoliata, Walk., Lep. Het. xi. p. 750, is typical *Septis mucens*, Hübn.; and X*ylophasia sectilis*, Guen., is a dark variety of the same.

HELIOTHIDÆ.

HELIOTHIS, *Ochs.*

Heliothis armigera.

Noctua armigera, Hübn., Noct. pl. 79, fig. 370 (1805-24).
Heliothis pulverosa, Walker, Lep. Het. xi. p. 688, n. 17 (1857).
H. conferta, Walker, *l. c.*, p. 690, n. 21 (1857).
Var. *H. umbrosus*, Grote, Proc. Ent. Soc. Phil. vol. i. p. 219 (1861-3).
Var. *H. succinea*, Moore, Proc. Zool. Soc. 1881, p. 443.
Europe, Asia, Africa, America, Australia. Coll. B. M.

This species shows considerable individual variation in size and coloration. *H. umbrosus* also differs in pattern, the black patches on the under surface being very feebly indicated and narrower. *H. succinea* is exactly like *H. umbrosus*, excepting that it is considerably smaller. We have a good many of both forms; and if *H. umbrosus* is not distinct, *H. succinea* must also be a variety; there is no character on the upper surface of the wings to separate either of them. It is possible that the *H. rubrescens* and *H. separata* of Walker may be varieties of *H. armigera*. The former appears to be strictly confined to Australia, but the latter has a wide distribution; there are specimens in the museum from the Navigator's Islands, Queensland, Java, Formosa, Shanghai, Japan, and the Congo. The pattern of both surfaces in each of these forms differs from that of typical *H. armigera;* and, therefore, in the absence of actual proof of their identity, it is better to permit them to stand as distinct species.

Heliothis dipsacea.

Noctua dipsacea, Linneus, Syst. Nat. xii. p. 856.

Var. *Heliothis adaucta*, Butler, Ann. & Mag. Nat. Hist. ser. 5, vol. i. p. 199 (1878); Ill. Typ. Lep. Het. iii. p. 19; pl. xlv. fig. 4 (1879).

Europe, Amur, Japan. Coll. B. M.

Very variable in size in a large series.

Heliothis scutuligera.

Heliothis scutuligera, Guenée, Noct. ii. p. 180, n. 932.

H. errans, Walker, Cat. Lep. Het. iii. p. 769 (1865).

South Africa. Coll. B. M.

The species, wrongly identified by Walker with *H. spinosæ*, *H. definiens*, and *H. punctifera*, are nearly allied species, not belonging to *Heliothis*.

As Grote suggested (Check List, p. 36, footnote), his *H. nuchalis* is not distinct from the European *H. scutosa*. I am not, however, prepared to say that *H. phlogophagus* is identical with *H. dipsacea;* the latter always has a far less undulated submarginal pale line on primaries, and a better defined dusky nebula from reniform spot to inner margin; it is usually, though by no means invariably, smaller.

HELIOCHILUS, *Grote.*

Heliochilus inflatus.

♂ *Anthœcia inflata*, Wallengren, Wien. Ent. Monatschr. iv. p. 172, n. 60 (1860).

♀ *Perigea albidentina*, Walker, Lep. Het. Suppl. 2, p. 680 (1865).

Honolulu (*Wllgr.*), Florida. Coll. B. M.

In all probability, *H. paradoxeus*, Grote, will prove to be a pale form of this species; at present it holds its place fairly well, from the absence of intermediate grades to the dark type, although the pattern is identical in the two forms.

Leocyma, *Guen.*

Nearly allied to *Pippona*, Harvey, of which genus it is probably the East Indian representative.

Leocyma tibialis.

Bombyx tibialis, Fabricius, Syst. Ent. p. 578, n. 76 (1775).
Leocyma dianæ, Guenée, Noct. ii. p. 213, n. 982 (1852).
Chasmina glabra, Walker, Lep. Het. Suppl. 2, p. 636 (1865).
India to Australia. Coll. B. M.

The genus *Thiganusa*, Walk., will take as its type *Leocyma apollinis*, Guen., = *T. euproctisoides*, Walk., Lep. Het. Suppl. 3, p. 979 (1865). Walker places the genus in the Ophiusidæ; but although Guenée was wrong in confounding it with the other species which he placed in *Leocyma*, it was a little nearer the mark than where Walker placed it. The genus should be placed near to *Xanthodes* = *Acontia* true.

Leocyma judicata.

Acontia judicata, Walker, Lep. Het. xv. p. 1760 (1858).
Chasmina linea, Hampson, Ill. Typ. Lep. Het. viii. p. 73, pl. cxlv. fig. 3 (1891).
India (Nilgiris). Types in Coll. B. M.

(To be continued.)

ENTOMOLOGICAL NOTES, CAPTURES, &c.

Cidaria reticulata variety.—This season I have bred a fine large specimen of the above. The centre of the fore wings black; the elliptical mark is only visible by a strong glass. I cannot describe it; it looks like an eclipse, with such an almost imaginary tracing of the mark which is so conspicuous on the ordinary form.—J. B. Hodgkinson.

Satyrus ianira, var.—At Morthoe, North Devon, on August 10th, I took a "bleached" male *Satyrus ianira*, having about three-quarters of the right hind wing (upper and under surface) almost colourless.—G. Renshaw; Sale Bridge House, Sale.

Variety of Lycæna corydon. — Whilst butterfly-hunting near Eastbourne on the 5th of September last, I captured a curious variety of the female of *Lycæna corydon*. Both the anterior and posterior wings possess the usual discoidal spot and marginal band of eye-like spots on the under surface; the colour, however, of the anterior wings is whitish, like the normal colour of the under side in the male, and only three black spots—the lower ones of those composing the usual row of seven—are visible. The posterior wings are of a brownish colour streaked with white, and the only other marking, besides the discoidal spot and marginal band, is the white submedian blotch. A somewhat similar variety is recorded from Lulworth, Dorsetshire, by Mr. Alfred T. Stiff (Entom. xxii. 160). — H. D. Sykes; The Cedars, Enfield, Oct. 11, 1891.

Note on Lycænidæ.—At the sand-hills near Lytham, in Lancashire, on September 12th of this year, I took a dwarf male *Lycæna icarus;* also, a few days afterwards, a male *Lycæna adonis* in good condition. Is not this rather northerly as a locality for the dwarf butterfly, and also for *L. adonis?*—G. Renshaw; Sale Bridge House, Sale, near Manchester.

Effect of Ammonia on the Ova of Lepidoptera. — Some ova of *Pericallia syringaria*, deposited July 18th, were accidentally placed in the ammonia-jar, where they remained four hours. This treatment destroyed the vitality of about half the number; the others hatched out on Aug. 4th, but all the larvæ died in their second moult. On a previous occasion a batch of the eggs of *Hadena oleracea* were deposited with some moths in the lethal chamber, and at the end of one hour removed therefrom. The moths were then dead, of course; but the eggs were not destroyed, as they produced larvæ in due course; but, as these were turned adrift to forage for themselves, the effect of the ammonia, if any, upon them is not known. —Richard South; 12, Abbey Gardens, St. John's Wood, N.W.

Effect of Cyanide of Potassium on the colour of Gonopteryx rhamni. — I noticed in the 'Proceedings of the Entomological Society,' May 1st, 1871 (quoted in Entom. for 1871, p. 323) a statement concerning a variety of *Gonopteryx rhamni*, to the effect that "Mr. Janson said he had noticed that yellow insects killed by cyanide of potassium became red."—R. M. Prideaux.

Pupæ wanted for Temperature Experiments.—I am greatly in want of a number of pupæ of British Lepidoptera for the purpose of carrying out some experiments on the result of change of temperature upon their emergence during an approaching voyage to the tropics, and shall be much obliged if any of my old correspondents or others will kindly supply me with some. My wish is to get as great a variety as possible, and the commonest species will be acceptable. They should be sent to the address below not later than the middle of November, and forwarded in common boxes that will not require to be returned, as my time is limited. Their receipt will be promptly acknowledged.—Gervase F. Mathew (Fleet Paymaster); H.M.S. 'Tyne,' Chatham.

Acronycta alni Larva near Manchester.—In case Sale, about six miles from Manchester, has not been recorded for *Acronycta alni*, I may mention that one August I took a larva from an alder tree in a friend's garden.—G. Renshaw; Sale Bridge House, Sale.

Larva of Acronycta alni at Clifton.—Whilst beating maple for *Ephyra omicronaria* larvæ, here in July last, down came a tiny larva of *Acronycta alni* into the tray. It is so marvellously like a bird-dropping in this stage that, unless previously known, it might be excusable to pass it over as such. After feeding and growing well for some time, it finally died, for no apparent reason, but I was able to preserve the skin by inflation.—R. M. Prideaux; 9, Vyvyan Terrace, Clifton, Bristol.

Pupation of Acronycta alni.—Mr. W. H. Livett, in referring to the larva of *Acronycta alni* (Entom. 245), mentions it having turned to a pupa in a slight web. Is this an occasional or a frequent custom? In 1889 I found two larvæ in this district, one on the horse-chestnut, the other on a beech tree. Finding, from Newman, that this larva also bored into stems for pupation, I placed some stems of the chestnut, about the size of one's finger, when they appeared ready for pupation. It was very interesting watching them excavate the stems from the ends; one, unfortunately, being stung, died before it had finished; but the other, having bored far enough in, reversed itself, sealing up the entrance with a fine web and particles of the pith it had thrown out, and emerged the following season a beautiful specimen.—T. B. JEFFERYS; Cirencester, Oct, 2, 1891.

PHIBALAPTERYX LAPIDATA, &c., IN STIRLINGSHIRE. — On Sept. 13th of last year I succeeded in getting five specimens of this rather local insect on some marshy ground near Fintry, Stirlingshire. This year I was unfortunately prevented from visiting the locality until the 19th, when I went over the ground along with a friend. We found the moths fairly plentiful, but nearly all in a more or less wasted condition. We will, however, get a very fair series each from our captures. When at rest on the rushes, *P. lapidata* bears a very striking resemblance to a large pug. Amongst other things netted during the day were—*Larentia cæsiata*, *Chesias spartiata*, *Celæna haworthii* (in great abundance), *Hydræcia nictitans*, *Charæas graminis*, *Tapinostola fulva*, &c. During the past season I have taken in the same district—*Emmelesia ericetata*, *Carsia imbutata*, *Agrotis lucernea*, *Plusia bractea*, *P. festucæ*, &c. — E. C. EGGLETON; Glasgow, Sept. 22, 1891.

NOTES FROM ROTHERHAM.—The season up to the middle of September has been, I think, one of the worst ever experienced in this district. Sugar has to a very large extent been a failure; several nights the sugared trees produced nothing at all, others a few solitary *Triphæna pronuba* came, and a few other common things; two nights in late June were fairly good, when *Thyatira batis* and *T. derasa* came freely. The weather during the day seemed all you could wish, wind S.W. and a nice breeze promising well; but as soon as the sun went down the wind dropped, and a heavy dew came on, making it unpleasant to get about, and insects do not fly much when there is a heavy dew. Larvæ have also been very scarce, compared with some years; very irregular as to size, and for the most part badly "stung." Out of forty-five *Triphæna fimbria*, only nineteen produced pupa, and other things were almost as bad. The best find this year was *Xanthia citrago;* after working for years for this insect, some seasons getting one or two only, I this year, quite by accident as it were, stumbled across the larva in almost any quantity.—JOHN A. YOUNG; 85, Fitzwilliam Road, Rotherham.

SPHINX CONVOLVULI AT RIPON.—On Sept. 25th I had brought to me a fine specimen of *S. convolvuli*, found at rest in a garden in the centre of the town. As far as I am aware, this is only the fourth appearance of the species in this neighbourhood.—C. CHAPMAN; Museum, Park Street, Ripon.

NOTE ON THE SECOND BROOD OF CIDARIA TRUNCATA. — At the end of June I captured a female *C. truncata* (*russata*), and she deposited a small batch of ova, which hatched July 20th. The larvæ fed up rapidly on sallow, and were all full-grown by the end of August. The first imago emerged on the 18th September; sixteen others followed, the last emerging on the 6th October.—WM. NEWMAN; 21, Russell Street, Darlington.

NOTE ON THE PAIRING OF AMPHIPYRA TRAGOPOGONIS. — On Sunday morning last (October 4th) a friend of mine found a pair of insects *in cop.*, which were brought to me for identification, and found to be *Amphipyra tragopogonis;* they remained coupled until noon on Monday. Some time during the afternoon of that day they separated, and the female deposited a few ova. I placed the box on one side, intending to take out the insects when a few more ova were laid. On Wednesday I looked at them, and was very much surprised to find that they had coupled again. Since the second coupling the female has laid about 150 to 200 eggs. Is it not unusual for the same pair of insects to coplulate twice?—J. N. Young; 85, Fitzwilliam Road, Rotherham.

Larva of Odontoptera bidentata. — I should like to suggest that the larva mentioned by Mr. Christy (Entom. 246) is probably that of *Odontoptera bidentata*, as I have known larvæ of this species vary much in the direction of that which he describes. It is certainly a disappointment to breed nothing but a typical *O. bidentata* from such a striking creature.—R. M. Prideaux.

Note on Hesperia thaumas. — Newman, in his 'Natural History of British Butterflies,' speaking of *Hesperia thaumas* (*linea*), says:—"It . . . has mysteriously disappeared from many places where it was formerly common." A particularly striking instance of this has come under my notice lately. I discovered *H. thaumas* in a field here in 1888; it was then extremely abundant: it was equally common at the end of June and the beginning of July in 1889, but for the last two years I have not turned up a solitary specimen, although I have frequently visited the locality. I have caught *H. sylvanus*, which I discovered there at the same time, every year. This disappearance of *H. thaumas* is to me quite unaccountable: I certainly have not exterminated it, as I did not take more than thirty or forty specimens altogether. — Henry D. Sykes; The Cedars, Enfield, Middlesex, Sept. 14, 1891.

Larva of Hadena pisi.—I have had two larvæ of *Hadena pisi*, which were found feeding on the common bracken in South Wales; they will also feed on *Aspidium filix-mas*, and I have seen this larva also on dwarf sallows, but cannot certify they feed thereon.—T. B. Jefferys.

Notes on some Lepidoptera in York District.—*Nudaria senex.*—This insect, like *Phibalapteryx lignata*, has not been so numerous with us of late years (and doubtless from the same cause). The evenings on which I have found it most abundant are those ushered in by a good shower of rain, especially if there be a slight mist rising from the ground. It is easily taken, as it flies slowly over the tops of the reeds, grasses, &c., or ascending the grass-stems. It does not long remain in good condition, and unfortunately, like many other species, flies most abundantly when getting worn. After its flight, which lasts but a short time, it may be taken not uncommonly at rest on the sedges. On a favourable evening from 40 to 50 or 60 specimens may be taken before dark by one collector.

Orthosia suspecta at York, season 1891.— This local species (which was first discovered at York by Mr. T. H. Allis in 1855) has been taken here this season in considerable numbers, and has been unusually common, as many as 1000 specimens having been taken on one night. In fact, I can without hesitation affirm that, during the eleven years I have collected Lepidoptera, I have never seen any species to equal it in numbers, as it even exceeded such species as *Xylophasia polyodon*, *Apamea oculea*, *Agrotis exclamationis*, *A. segetum*, *Calymina trapezina*, or *Triphæna pronuba*, which in favourable seasons are about the commonest Noctuæ at sugar. From amongst a great number that I have had to select from, I have picked out some very beautiful, and in many instances striking, varieties, of which about fifty of the best now adorn my collection. These vary from light and dark grey to various shades of brown, and to a very dark form, almost black. To fully and accurately define the many different shades of red met with in a large selected series of this species would tax the ability of a specialist in colours; a few examples are beautifully mottled. It would have been possible for anyone to have taken a fair number each evening from off the trees which had been sugared the previous night. I frequently counted three or four on the trees when renewing the sugar; some of these found their way into the treacle-pot, and helped to thicken the mixture. It was a difficult matter to box a single specimen at a patch, as two, three, or more would drop in at the same time. As a rule, those specimens which dropped into the net from off the patches, unless specialities (by which I mean varieties), were set at liberty, as I found it best and quickest to select them from off the trees. I am glad to state that, after sacrificing many female specimens, I succeeded in obtaining fertile ova from two, *viz.*, sixty from one, and twenty from the other, and that next year I hope to see a full and detailed description of the larva (which I understand has not, so far, been described) in the pages of the 'Entomologist.'

Plusia festucæ. — This handsome species occurs pretty freely at York, and may be taken, in company with *P. chrysitis*, *P. iota*, and *P. pulchrina*, flying over the flowers of the ragged robin, to which it seems especially partial. I have found the chrysalis attached to the sedges and to the leaves of the gale; it requires a smart, quick stroke with the net to catch *P. festucæ*, as, if once missed, it does not often give its would-be captor another chance. The females are darker, smaller, and usually quieter, when in the net, than the males. The second brood does not occur with us at York. It is not unusual for a collector to take from 20 to 25 specimens before dark.

Geometra papilionaria. — This remarkably fine species occurs with us some seasons not uncommonly. It is generally taken in the imago state, and flies some eight feet from the ground; it is not a difficult species to net, and a very pleasant one to box. With regard to the question now on the *tapis* as to its hour of flight: from my experience with this species, and as the result of conversation with other entomologists who have taken it in greater numbers than myself (and I have taken a good many), I unhesitatingly affirm that the best time to catch *G. papilionaria* is about 11 p.m., or from that to midnight, and then again just before dawn, at both of which times it occurs more commonly than at dusk, although of course I have taken odd specimens then, and indeed all through the night. When at rest upon a birch-leaf or grass-stalk, it requires a practised eye to detect it. The larvæ, too, bear a wonderful resemblance to the stalk of the birch-leaves on which they feed; the young larvæ seem to prefer the buds to the open leaves, and thus kill the twig on which they feed.

Collix sparsata has never been known to occur here in anything like the numbers that it appeared this season. It simply swarmed. I never remember having seen any Geometræ so common before; the only species that vie with it in number are *Ypsipetes elutata*, *Melanippe subtristata*, *Larentia didymata*, *Melanthia rubiginata*, and *Epione vespertaria:* some of the specimens taken were almost black. It would have been possible for a collector to have taken 100 specimens, or even more, before dark. It usually flies low in the rides of the wood in which it occurs. The flowers of the buckthorn seem to be especially attractive to it. Its flight does not last long, and it is a species which soon becomes worn. The larvæ are of a pale greenish colour, and are found in August on *Lysimachia vulgaris*, the handsome yellow flowers of which are very conspicuous in the locality where *C. sparsata* occurs; they pupate amongst dead leaves.

Phibalapteryx lignata. — This insect has been fairly common with us this year, although in nothing like its former numbers of some five to six years ago. The improved drainage of the ground on which it occurs seems to have diminished its numbers considerably. As is doubtless well known, it is a double-brooded species, the first brood appearing here about the 8th or 10th of June, and it may be taken from that date till the end of the month. The best night I had with *P. lignata* this season was on June 20th last, when I took some fifty specimens, including one very dark example; and, with the exception of two or three *Cabera pusaria*, it appeared to be the only insect on the wing; the night was cold and clear, with the wind due east. The second brood, which are smaller and darker than the first, appear about September 6th, and I have taken it from that date till the end of the month; it does not then occur so numerously as in June. It is one of those species that is seldom met with in any numbers in first-class condition. Take *P. lignata* when you may, there is sure to be a large percentage of more or less worn specimens. — William Hewett; 12, Howard Street, York.

A Day among the "Buttons."—Many years ago I promised myself, in the then future, an excursion to the New Forest in search of varieties of *Peronea cristana*, but until the present season I have been unable to spare time when they would be at their best in point of condition. Mr. Bond used to say, the greater part of his long and varied series was the result of one expedition, and visions of what I might also capture almost haunted me when I was "hot" on Tortrices. It was then with much pleasure that I lately received an invitation from Mr. Meek (who has taken up his residence at Brockenhurst) to join him in hunting up the head-quarters of the species in his locality. With most perfect weather in our favour, we were able to secure a fine assortment of varied forms. The principal of these were *brunneana*, *ustulana*, *spadiceana* (with and without a vitta), *sericana*, *desfontainana*, *bentleyana*, *cristalana*, *striana*, *cristana*, *subvittana*, *alboflammeana*, *chantana*, *fulvovittana*, *albovittana*, and several others new to me, including one with the whole wing and tuft of a uniform blue-black. Master Willy Meek worked like a Trojan, and secured almost as many specimens as his father. I was not so fortunate, nor was the fourth net of our party. There is a charm about "buttoning" that can only be appreciated by the variety collector, and each specimen missed is regretted more than would otherwise be the case, for it is of course impossible to tell what variety the beating-stick may next disturb from the bushes; but it is hard work, as the stiffness of my arms testified next morning. Mr. Meek tells me it has always been a day-dream of his, to retire from business to some good centre for collecting, where he could not only enjoy his favourite pursuit, but have a crust of bread and cheese to give an old friend or passing brother collector. Certainly he treated me very much more handsomely, and upon my leaving presented me with all the specimens taken during my stay; these included not only the "buttons," but about a score of *Sarothripa revayana* and *Leptogramma literana*, and a variety of smaller things, such as *Coriscium brongniardellum* and *C. citrinella.* — Sydney Webb; Dover.

Forthcoming Works on British Entomology.—Messrs. L. Reeve & Co. announce that they are about to bring out a new work on 'The Lepidoptera of the British Islands,' by Charles G. Barrett. It is proposed to publish two editions, one on large paper, with hand-coloured plates, the other on small paper in volumes. The same publishers have also in hand 'The Hemiptera-Heteroptera of the British Islands,' by Edward Saunders. This will be issued in eight parts, with coloured plates.—Ed.

Entomological Pins.—We have received the following letter from Messrs. Kirby, Beard & Co. (Limited):—"We notice in the September number of the 'Entomologist' you make a few remarks with regard to the difficulty of procuring really good, strong, well-pointed, black, entomological pins. We quite agree with all you say, and admit that, owing to the fineness of the wire, it is very difficult to obtain really good points, and for the same cause there is great liability of the pins becoming soft during the process of enamelling. But we wish to state that we have at length succeeded in producing a pin which we think has all the qualities you suggest, and which should answer all requirements; it is made of steel, so cannot bend, and does not produce verdigris, and, having a needle-point, will penetrate any reasonable substance; whilst, being enamelled black, it has all the appearance of the ordinary brass one. So, far, we have only made these pins in the larger or continental sizes, as the demand has not been sufficient to enable us to produce the smaller sizes; we think, however, it is only owing to the fact of their not being sufficiently well known, and so should be glad if you will kindly find space for this letter in your next issue."

SOCIETIES.

Entomological Society of London.—*October 7th*, 1891.—Dr. David Sharp, F.R.S., Vice-President, in the chair. The Chairman referred to the death, on the 14th September last, of Mr. E. W. Janson, who had been a Member of the Society since 1843, and who had formerly filled the offices of Secretary and Librarian respectively. The Rev. Dr. Walker exhibited a long series of several species of *Erebia*, and of *Argynnis pales*, which he had recently captured near Roldal, in Norway. Mr. W. L. Distant exhibited specimens of *Danais chrysippus*, with its two varietal forms, *alcippus*, Cram., and *dorippus*, Klug., all which he found together in the Pretoria district of the Transvaal. Mr. Jenner Weir, Colonel Swinhoe, and Mr. Distant took part in the discussion which ensued as to these forms and their distribution. The Rev. W. F. Johnson sent for exhibition specimens of *Velia currens* from stagnant water near Armagh; also a specimen of *Nabis limbatus*, killed whilst holding on to its prey, a very hard species of Ichneumon. Mr. Saunders thought that, from the nature of the Ichneumon, the only chance the *Nabis* had of reaching its internal juices would be through the anal opening, as recorded by Mr. E. A. Butler in a similar case, in the Ent. Mo. Mag. Oct. 1891. Mr. F. P. Pascoe exhibited two British species of Diptera, unnamed. He said they had been submitted to Mr. R. H. Meade, but were unknown to him, and are probably new to the British list. Mr. R. Adkin exhibited two specimens of a supposed new species of Tortrix (*Tortrix donelana*, Carpenter), bred from larvæ found on *pine* trees at Tuam. Mr. C. G. Barrett said he examined the specimens with great care, but he did not consider that they belonged to a new species. He was unable to distinguish them from *Tortrix viburnana*. Mons. A. Wailly exhibited preserved larvæ, in various stages, of *Citheronia regalis*, which he had bred from ova received from Iowa, United States. He said that the natives called this larva the Hickory Horned Devil, and that the specimens exhibited were the first that had been bred in this country. Mons. Wailly further exhibited three female specimens of *Antheræa yamamai* bred from cocoons received from Japan; also a nest of cocoons of *Bombyx radama*, received from the west coast of Madagascar. Prof. J. B. Smith, of the United States, and Col. Swinhoe took part in a discussion on the habits of the larvæ of *Citheronia regalis*, and as to the period at which they dropped their spines prior to pupating. Dr. Sharp exhibited several specimens of a weevil, *Ectopsis ferrugalis*, the ends of the elytra of which bore a close resemblance to the section of a twig cut with a sharp knife. He said he had received the specimens from Mr. G. V. Hudson, of Wellington, New Zealand, who stated that they were found resting in large numbers on dead trunks and branches of *Panax arborea* in the forests. Mr. G. C. Champion stated that the species of *Forficulidæ*, captured by Mr. J. J. Walker, R.N., in Tasmania, and exhibited by himself at the meeting of the Society in April last, was, he believed, referable to *Anisolabis tasmanica*, Bormans, described in the 'Comptes Rendus' of the Ent. Soc. Belgique, 1880, p. lxviii. The Rev. A. E. Eaton made some remarks on the synonymy of the *Psychodidæ*, and stated that since August, 1890, he had identified all of the British species in Mr. Verrall's list, except *Sycorax silacea*. Mr. Gervase F. Mathew, R.N., communicated a paper entitled "The Effect of Change of Climate upon the Emergence of certain species of Lepidoptera." A discussion followed, in which Mr. Stainton, Mr. Barrett, Dr. Sharp, and Mr. M'Lachlan took part.—H. Goss, *Hon. Sec.*

SOUTH LONDON ENTOMOLOGICAL AND NATURAL HISTORY SOCIETY.—Sept. 24th, 1891, W. H. Tugwell, Esq., Ph.C., President, in the chair. Mr. South referred to Mr. Weir's remarks, at the previous meeting, on specimens of *Arctia caia*, L., with black antennæ, and exhibited two specimens from Mr. Leach's collection,—one English, the other from Japan, both having blackish antennæ. Mr. Tugwell also exhibited two examples from his series. Mr. C. G. Barrett pointed out that in none of the specimens did he consider the antennæ could be described as black. Mr. D. J. H. Carpenter exhibited very blue female forms of *Lycæna icarus*, Rott., from Sussex. Mr. Barker, a specimen of *Leucania albipuncta*, H., taken at Folkestone during August. Mr. Jenner Weir, a specimen of *Bombyx mori*, L., bred from a cocoon found by him on a mulberry tree in his garden at Beckenham, and stated that, although he had made every possible enquiry, he could not learn that anyone in the neighbourhood had been rearing the species. Mr. Tugwell and Mr. South both remarked on the wings of the specimen being fully developed, Mr. South adding that in Japan there were two forms of the species, a domestic one and a wild one, and it was possible that some one might have been rearing this wild form. Mr. Tugwell, specimens of *Epinephile tithonus*, L., with three distinct ocelli on each of the superior wings. Mr. Tutt remarked that he had recently recorded this form. Mr. Frohawk had noticed it at Chattenden, Mr. Carrington in Essex, Mr. Hawes had received it from Devon and Norfolk, Mr. Briggs had taken it at Wandsworth and Wimbledon. Mr. C. J. Barrett said that although he had examined large numbers of the species in

Pembrokeshire, he had never found any specimens so strongly marked as were those of Mr. Tugwell. Mr. R. Adkin exhibited species bred from larvæ received from Forres, together with southern examples, for comparison, and made remarks thereon; he also exhibited a specimen of *Cabera pusaria*, L., in which the first and central lines were very close together, a feature regarded as indicating the form *C. rotundaria*, Haw.; and some observations were made relative to this last exhibit, reference being made by Mr. C. G. Barrett to the series bred by Mr. Atmore, in which he had got every intermediate form between the two, one specimen being *pusaria* on one side and *rotundaria* on the other. Mr. C. Fenn exhibited *Calymnia diffinis*, L., varieties of *Agrotis exclamationis*, L., *Dasypolia templi*, Thnb., a very small dwarf form of *Melanippe fluctuata*, L., and a long bred series of *Cidaria truncata*, Hübn., with the three parent females, and remarked that all the ova were laid within a few days of each other, but there was an interval of seven weeks between the emergence of the first and last specimens, while a portion of one brood was now preparing to hibernate. Some discussion took place on the characteristic distinctions between this species and *C. immanata*, Haw. Mr. J. R. Billups, a specimen of *Deilephila capensis*, one of three said to have been captured at sea, 472 miles from land. Mr. C. A. Briggs, two varieties of *Melitæa aurinia*, Rott. Mr. Carrington, the so-called Grouse Fly (*Ornithomyia avicularia*, L.), and remarked that this winged parasite was not confined to grouse, being found on partridges, woodpeckers, starlings, rooks, and many other birds. Mr. H. Moore, a series of both the red, and blue-winged forms of *Œdipoda fasciata*, Fisch., from Trocadero, near Cadiz, and remarked that the species was very conspicuous on the wing, but when at rest was difficult to detect, owing to their resemblance to the soil. Mr. Jenner Weir made some remarks upon this exhibit. Mr. Carrington made some observations on a visit to Skegness. Mr. E. Step read a list of Fungi noted at the Society's outing to Ashstead on the 19th inst.

Oct. 8th. — The President in the chair. Mr. Walter Smith, of Teddington, was elected a member. Mr. Tugwell exhibited *Agrotis agathina*, Dup., and *A. strigula*, Thnb., southern and northern forms; also *Noctua castanea*, Esp., from Perthshire, and the var. *neglecta*, Hb., from the New Forest, Hants. Mr. Tugwell, on behalf of Mr. Boden, exhibited a specimen of *Prodenia littoralis*, Boisd., bred from a tomato; the pupa-case was also shown. Mr. South remarked that the species was fairly common in India. Mr. Jäger, *Callimorpha hera*, L., and var. *lutescens*, L., bred from ova; also *Agrotis ripæ*, Hb., bred from larvæ taken on the Essex coast; some of the specimens were very light. Mr. West, a variety of *Catocala nupta*, L., taken at Streatham, having the inferior wings streaked with yellow. Mr. H. J. Turner, *Zygæna meliloti*, Esp., from the New Forest, taken this season, and *Xylophasia monoglypha*, Hufn., from the North. Mr. A. Robinson, a long and varied series of *Nonagria cannæ*, Och., taken by himself and Mr. Bird in Norfolk; Mr. Robinson remarked on some of the specimens, which were very dark. Mr. C. G. Barrett said the specimens were different from any he had seen from Norfolk. Mr. R. Adkin, *Sesia musciformis*, View., from the Isle of Man and Cornwall, and remarked that those from the former locality appeared to be more robust and more densely clothed with scales than the Cornish specimens. Mr. Adkin also exhibited a male and female specimen of a *Tortrix*, bred from larvæ feeding among the needles of a shoot of Scotch fir that he had received from Tuam, Co. Galway, and which had been described and figured from specimens reared in 1890 under the name of *Tortrix donelana* by Mr. G. H. Carpenter

(Scien. Proc. R. Dublin Soc. vol. vii. p. 2), and read notes, in the course of which he mentioned that the imago appeared to bear a strong resemblance to *T. viburnana*, Fb.; and the larvæ also were very similar. Mr. C. G. Barrett also exhibited specimens of this *Tortrix*, and of *T. viburnana*, and remarked that in his opinion the so-called *donelana* were small specimens of *T. viburnana*. Mr. Tutt said he considered the species to be *Tortrix steineriana*, var. *dohrniana*, of which he had received a series from Herr Hoffman. Mr. Short exhibited long and varied series of *Noctua xanthographa*, Fb., from Hampstead and Folkestone, together with other species from the last-named locality.

Oct. 22nd.—The President in the chair. This was a special meeting for the purpose of considering the amendments to the new Bye-Laws proposed by the Council. Among the more important amendments was one by Mr. Watson and Mr. Winkley to change the name of the Society to the London Natural History Society, the reason being that, although founded as a local Society, it could not now be said to be such, as out of close upon 250 members not quite 100 could be described as South London men. This was opposed, on the ground that the Society was well known by its present name, and a change might not be desirable; the amendment was not carried. Mr. Turner, in introducing an amendment to add to the objects of the Society "the compilation of a Fauna and Flora of the S. Eastern Counties," said this work had long been undertaken by the Society, a considerable amount of money expended, and a quantity of material got together, and yet the Committee appointed in 1885 had let the matter drop. The Treasurer said that recently considerable misrepresentation and some erroneous statements had been made with reference to this matter, the true facts being that three members of the Committee, who really brought the matter forward in 1885, had given £11 for the preliminary expenses, for the purpose of seeing whether it was possible to publish such a work; £10 10s. of this had been spent on the preparation and issuing of a circular, map of the district, and directions for preparing local lists. The Secretary said that after several hundreds of these documents had been issued, he had received five lists, one relating to Mollusca, two to Ornithology, and two to Lepidoptera; the Committee therefore had not seen their way to proceed with the proposed work. The Council proposed some alterations as to the mode of nominating and electing officers, and Mr. Turner proposed an amendment, which was supported by Messrs. Tutt, Hodges, Fenn, and others, the drift of their remarks being that if the Council's suggestions were adopted, the Council would become a close body. Messrs. Adkin, Carrington, Hall, and others spoke against the amendment, to the effect that the arguments brought forward in support thereof were entirely misleading, as the Council's propositions were usual in all other Scientific Societies, and, if adopted, would simply give the Council power to nominate officers for the ensuing year, and so ensure sufficient nominations; if the Society's nominees were objected to, members had the right to make other nominations, and all the officers had to be elected, two ordinary members of the Council not being eligible for re-election within twelve months. The amendment was not carried. Some of the other changes are, that the President shall hold office for one year only, and the annual subscription of future country members to be 5*s*. The adoption of the Bye-Laws in place of the old Rules was moved by Mr. Barrett, and seconded by Mr. Hall; and the meeting closed with votes of thanks to Mr. Barrett for introducing the Bye-Laws to the Meeting, and to Mr. Briggs for drafting them.—H. W. BARKER, *Hon. Sec.*

Lancashire and Cheshire Entomological Society.—*October* 12*th*, 1891.—The Rev. H. H. Higgins, Vice-President, in the chair. Mr. C. E. Stott read a paper entitled "Notes on *Celæna haworthii*," in which he described the haunts of this species, cautioning the would-be captor of the necessity of very gently approaching the heather on which the insect rests, otherwise it would take fright and drop to the roots, from which it is almost impossible to extricate it. The author then gave a short history of its earlier stages, and concluded by describing the different local varieties. The paper was illustrated by specimens of the species. Mr. J. Collins read "A few Remarks on *Aplecta nebulosa*," stating he had bred five melanic forms from Delamere, for which he proposed the varietal name of *robsoni*, in honour of the well-known entomologist, Mr. J. E. Robson, of Hartlepool. Mr. Collins exhibited the five specimens, with others bred at the same time. The Secretary read a communication from Mr. J. W. Tutt, who wrote that the specimens of *Tortrix donelana* exhibited at the last meeting had, at the meeting of the South London Entomological Society, been stated to be *T. steineriana* var. *dohrniana*, and that the name *donelana* would therefore fall to the ground. But it was pointed out that *donelana* had already been referred to *steineriana*, but incorrectly so. Mr. Townsing showed a remarkable gynandromorphous specimen of *Orgyia antiqua*, the head of which possessed the male structure, while the body was that of the female; Mr. Harker a variety of *Vanessa io*, the ground-colour of which was fulvous brown, apparently owing to the thinness of the scales; Mr. Gregson a very variable series of *Dianthœcia conspersa*, including the melanic form; Messrs. Townsing and Prince some dark forms of *Abraxas grossulariata*; and Mr. Pierce (the Secretary) *Retinia resinana* and their resinous nodules from the fir trees.—F. N. Pierce, *Hon. Sec.*

Birmingham Entomological Society.—*Sept.* 21*st*, 1891.—Mr. R. C. Bradley in the chair. Mr. P. W. Abbott showed *Tæniocampa opima* and *T. gracilis*, and *Nyssia zonaria* from Wallasey; also *Argynnis paphia* var. *valesina* from the New Forest. Mr. G. W. Wynn showed *Sesia culiciformis* from Wyre Forest. Mr. W. Harrison showed a bred series of *Selidosema ericetaria* from the New Forest. Mr. R. C. Bradley showed four specimens of *Pteropœcilia lamed* from Sutton, which he said Mr. Verrall had confirmed. Mr. C. J. Wainwright showed *Plusia orichalcea* and *Arctophila musitorus* from N. Cornwall. Mr. W. Harrison showed a box of beautifully preserved larvæ. He had managed to retain the green colours in *Saturnia carpini* and others by inflating them and allowing them to dry naturally in cool air, which takes about twenty minutes only.

Oct. 5*th*.—Mr. W. G. Blatch, President, in the chair. Mr. R. C. Bradley showed a long series of *Spilographa zoe* from Moseley. This species is usually found singly, but Mr. Bradley succeeded in taking it freely from the under sides of leaves at Moseley. Mr. G. W. Wynn showed a box full of large American Bombyces; also *Xylophasia hepatica*, which he had bred from pupæ found underneath the bark of poplars at Cleeve Prior; they were in cocoons and situations which exactly resembled those of *Acronycta megacephala*. Mr. W. Harrison showed *Papilio machaon* from Wicken Fen. Mr. W. G. Blatch showed the following beetles:—*Homalota crassicornis*, from Bewdley; *Oxytelus fulvipes*, *Henoticus serratus* (a series), *Micropeplus tesserula* (a series), and *Lampronia luzella*, all from Knowle.—C. J. Wainwright, *Hon. Sec.*

THE ENTOMOLOGIST.

Vol. XXIV.] DECEMBER, 1891. [No. 343.

EARLY STAGES OF *ARGYROLEPIA MARITIMANA*, Guen.

By George Elisha, F.E.S.

Plate V.

The egg is, no doubt, laid in the flower-heads of the sea-holly (*Eryngium maritimum*), (fig. 1), and occasionally in the strong flowering side-shoots, about the first week in July, for I have observed traces of the operations of the larva towards the end of the month in a slight discoloration, which gradually extends as the larva works downwards in the stem, till the whole of the immature flower-head becomes withered and brown.

The larva, in many cases, on arriving at the first joint, eats its way out, and crawling down the stem bores a fresh hole under the first joint above the surface of the sand, gradually working its way in and down towards the soft fleshy root (fig. 5 *a*); others mine from the flower-head through the whole length of the stem, which is filled with frass as the larva proceeds. They are all down in the roots by about the beginning of September, and continue mining some considerable distance, in many cases to a depth of six or eight inches below the surface of the sand.

About the first week in October they are getting full grown, and this is about the best time to collect them, for if taken earlier the difficulty of rearing them is so great that it is sheer waste of time to take them, to say nothing of the useless destruction of such a very local species.

The larva (fig. 2) is white, inclining to yellowish, rather transparent looking, with brown head and black spiracles, emitting short hairs, and is about three-quarters of an inch when full grown; it eats out the whole of the interior portion of the soft root, leaving only a thin shell or skin, and remaining in the larva state till the end of March, when they are found working their way up to the top of the root, where they hollow out a sort of chamber; and towards the beginning of May change to the pupa state (figs. 6, 7).

The perfect insect (fig. 3) emerges about the second week in June, leaving the pupa-case sticking out of the crown of the root (fig. 4). They appear very sluggish, crawling to the top of the stems and remaining in the same position for a day or two; if disturbed they seldom attempt to fly, but run about on the surface of the sand, up another stem, and settle down quietly. The larvæ are very subject to ichneumons, of which considerably more are bred than moths; the name of this parasite, I am informed by Mr. Bridgman, of Norwich, is *Glypta rubicunda*, n. sp., a species of Ichneumonidæ new to science.

I have found the larvæ on various parts of the Essex coast, where the food-plant was growing, and have searched well along the coast from Deal to Sandwich (its old locality), but the *Eryngium* seems to have almost disappeared from that particular spot, so that my search there has proved fruitless.

In collecting these larvæ it is most important to get up the long pipe-like roots (fig. 5), without injuring the mined portion, with about two or three inches of sound root beyond the mine for the larva to continue feeding in till it is full grown. The roots are very brittle, about the size of an ordinary lead-pencil, some slightly larger, of a light brown colour, and penetrating deep into the sand, the mined portion becoming black and discoloured, very soft, and soon injured, so that the sand must be carefully scraped away from the roots affected till the end of the mined portion is reached; and as this necessitates digging down eight or ten inches, it is rather wearisome work, often ending in disappointment, for if the mined portion is wet and flabby the larva will be found dead in the mine.

As there is considerable risk in opening the mined roots to examine them, it is best to take all those that appear to contain larvæ and place them upright in sand, imitating nature as near as possible. But they are difficult to breed; at least such is my experience, for I have never bred more than one or two insects out of every dozen mined roots collected, caused, no doubt, by so many of the roots dug up containing larvæ killed or stung by ichneumons; and, again, by the very different conditions one is obliged to adopt in rearing them away from their native habitat.

Shepherdess Walk, N.

INSECT PIGMENTS.

By T. D. A. Cockerell, F.Z.S.

In the final part of his valuable series of papers on Insect Colours, Mr. Coste devotes two pages (Entom. 209-211) to discussing and disproving a supposed hypothesis of mine that the evolutional order of colours was yellow, white, red; white being developed from yellow, and red from white! This has so astonished me, that I have looked at everything I ever wrote on the subject* to see if anywhere there is a reference to the origin of red from white, or indeed from any colour but yellow. As I fail to find such reference, and do not remember ever having entertained such an idea, I cannot but conclude that Mr. Coste has attacked a theory which had no existence until it was set up to be overthrown in Entom. p. 209!

However, I *did* at one time suppose that white had arisen from some yellow pigment, just as red had. At that time I was not aware of the physical (non-pigmental) nature of at least the vast majority of whites, and erred accordingly. But I indicated the probable error of my first impressions, and pointed out the difficulties besetting the question in Entom. 1889, p. 126, before Mr. Coste began to write his papers.

So far as Mr. Coste's main contentions go, I have indeed "long since been convinced," for they agree very well with much that I had myself imagined, and duly set forth, in 1887. But of course I am far from denying the value of Mr. Coste's work. Anybody may speculate, as I did, on the course of evolution, but such speculations are chiefly useful if they lead to detailed observation and experiment, whereby the real facts are ascertained. Even the discussion of my imaginary theory is most instructive, and Mr. Coste's summary of results is full of suggestions for future investigations. In the future, our knowledge of the nature of insect pigments ought to grow rapidly. Some of the varieties predicted by Mr. Coste, on pp. 207, 208, are already on record,—how many I cannot now say. *Chærocampa porcellus* has a form in which pink is replaced by yellow. *Anthocharis cardamines,* male, with the orange only on the right wing, is recorded in Entom., 1879, p. 181. A yellow var. of the female *Tortrix viridana* is known: see Dr. Chapman, Ent. Rec., 1890, p. 177. *Vanessa urticæ,* pale yellow var., is recorded in Ent. Rec., 1891, p. 10. *Epinephele tithonus,* pale or "bleached" forms, are recorded in Entom. xi. 229; xvi. 234; xix. 230. For a red var. of *Arctia villica,* see Entom., 1889, p. 2.

Institute of Jamaica; Kingston, Jamaica, Sept. 20, 1891.

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* It would be useless to repeat here the statements that I have already made in print; but in case anyone should care to look them up, here is the list of references:—

(1.) The relation of red to yellow. Proc. S. Lond. Ent. Soc. for 1887, p. 45, and pp. 101-103 (detailed discussion); Entom., 1887, p. 151; Ent. News, 1890, p. 4.

(2.) Orange and yellow. Entom., 1888, p. 189.

(3.) White and yellow. Proc. S. Lond. Ent. Soc. for 1889, p. 139; Entom., 1888, p. 113; Entom., 1889, p. 126.

(4.) Red, yellow, and white. Proc. S. Lond. Ent. Soc. for 1888, p. 57 (see also Ent. Rec., 1890, p. 57).

(5.) Pallid and albino forms. Proc. S. Lond. Ent. Soc. for 1887, p. 100 (attributed to arrest in development); Entom., 1889, p. 4, and as to pallid females, p. 5.

A PRELIMINARY LIST OF THE INSECT-FAUNA OF MIDDLESEX.

COMPILED BY T. D. A. COCKERELL, F.Z.S., F.E.S.

(Continued from p. 160.)

SHORTLY before leaving England I received three lists of Lepidoptera, containing many interesting records, as follows:—

(26.) H. Vaughan. A MS. list of Lepidoptera taken in Middlesex north of London, within six miles of Charing Cross. These insects were nearly all taken by Mr. Vaughan, Dr. H. Guard Knaggs, or Mr. Henry Bartlett. Many of the localities are now destroyed. This valuable list includes localities for many rarities, and the following species additional to the published lists:—

Pararge egeria, L., Hornsey (*Vaughan*).

Nudaria senex, Hb., Hammersmith Marshes (*Knaggs*).

Drepana falcataria, L. (as *P. falcula*), Bishop's Wood, Hampstead (*Bartlett*).

Notodonta dromedarius, L., Bishop's Wood (*Bartlett*).

Cymatophora or, Fb., Bishop's Wood (*Vaughan*).

Leucania obsoleta, Hb., Hammersmith Marshes (*Knaggs*).

Neuria reticulata, Vill. (as *saponariæ*), Bishop's Wood, one in 1865 (*Vaughan*).

Grammesia trigrammica, Hufn. (as *trilinea*), vars. *bilinea*, Hb., and *semifuscans*, Bishop's Wood (*Vaughan*).

Agrotis exclamationis var. *plaga*, St., Bishop's Wood (*Vaughan*).

Aplecta occulta, L., field adjoining Maldon Crescent, one specimen about 1860 (*Knaggs*). *A. tincta*, Brahm, Hampstead (*Knaggs*).

Concerning *Leucophasia sinapis* Mr. Vaughan writes: "The late Col. C. J. Cox informed me that when he was a boy he had captured examples in Bishop's Wood."

(27.) H. Rowland-Brown. A MS. list of Noctuæ observed at Harrow Weald, Middlesex. The following species are additional to the published lists:—

Miana literosa, Haw., quoted with a query.

Polia chi, L.

Trigonophora flammea, Esp.

Hadena adusta, Esp.

The total number of Noctuæ in this Harrow-Weald list is 73.

(28.) J. M. Adye. A MS. list of Lepidoptera taken at Ealing and Willesden. The two following are additions to the lists given:—

Bombyx quercus, L., near Ealing. This species was quoted for Middlesex with a query on p. 68.

Dasypolia templi, Thnb., one at Ealing.

LEPIDOPTERA.

Noctuidæ subfam. *Xylininæ.*

Xylocampa areola, Esp. (*lithoriza*, Bork.), Mill Hill, at sugar, also bred (*South*); Hampstead Heath, 1887 (*Watts*); Harefield, once (*Wall*); Harrow-Weald (*Rowland-Brown*).

Calocampa vetusta, Hb., Mill Hill, at sugar (*South*). *C. exoleta*, L., Mill Hill, at sugar (*South*); Isleworth (*Meyers*); Bishop's Wood, Hampstead (*H. Bartlett* fide *Vaughan*); Harefield, sparingly (*Wall*).

Xylina semibrunnea, Haw., Mill Hill, one at sugar (*South*); Harefield, two (*Wall*); Harrow-Weald (*Rowland-Brown*); Ealing, one (*Adye*). *X. ornithopus*, Rott., Brook Green, Hammersmith (*Tarbat*).

Asteroscopus sphinx, Hufn., Harefield, a few taken most years (*Wall*).

Cucullia umbratica, L., Hampstead Heath, Clutterhouse Lane, Old Oak Common, on palings (*Godwin*); Chiswick (*Sich*); Harefield, 1885 (*Wall*). *C. verbasci*, L., Harefield, larvæ common on *Verbascum* in garden (*Wall*). *C. chamomillæ*, Schiff., Chiswick, once at rest on a paling (*Sich*); Regent's Park (*F. Bartlett* fide *Vaughan*).

Subf. *Gonopterinæ.*

Gonoptera libatrix, L., Mill Hill, at sugar, also bred (*South*); Chiswick, larvæ on willow and balsam (*Sich*); Bedford Park (*Fenn*); Isleworth (*Ckll.*); Hampstead (*Vaughan*); Harefield, generally common (*Wall*); Harrow-Weald (*Rowland-Brown*); Hammersmith (*Mera*); Clapton (*C. Carter* fide *Bacot*); Bloomsbury (*British Museum*).

Subf. *Plusiinæ.*

Habrostola tripartita, Hufn. (*urticæ*, Hb.), larvæ out of nettles, Clutterhouse Lane, commonly (*Godwin*); Mill Hill (*South*); Maldon Crescent (*Knaggs* fide *Vaughan*); Harefield, occasional (*Wall*). *H. triplasia*, L., larvæ out of nettles, Clutterhouse Lane, rare (*Godwin*); Chiswick, common (*Sich*); Isleworth (*Fenn*); Kentish Town, 1860-65 (*Vaughan*); Maldon Crescent (*Knaggs* fide *Vaughan*); Highgate Woods (*Shepherd*); Hammersmith (*Mera*); Clapton (*Bacot*); Tottenham (*Prout*).

Plusia chrysitis, L., Clutterhouse Lane, Old Oak Common, West Hampstead (*Godwin*); Mill Hill, netted at dusk amongst nettles (*South*); Chiswick, at flowers of *Ballota nigra* (*Sich*); Bedford Park (*Fenn*); Isleworth (*Miss K. Fenn*); South Hampstead (*Watts*); Highgate (*Vaughan*); Harefield, frequent (*Wall*); Finchley (*Shepherd*); Harrow-Weald (*Rowland-Brown*). *P. iota*, L., Clutterhouse Lane, larva on nettle, rare (*Godwin*); Mill Hill, netted at dusk amongst geraniums (*South*); Hampstead Heath (*Watts*); Bishop's Wood (*Vaughan*); Harefield, once (*Wall*); Harrow-Weald (*Rowland-Brown*). *P. gamma*, L., generally distributed (*Godwin*); Mill Hill, netted at dusk amongst geraniums (*South*); Chiswick, abundant (*Sich*); Bedford Park (*Miss E. Sharpe*); Isleworth (*Fenn*); common (*Watts*); everywhere (*Vaughan*); Harefield (*Wall*); Tufnell Park (*Shepherd*); Harrow-Weald (*Rowland-Brown*); Hammersmith (*Mera*); Clapton (*Bacot*); Dalston (*Prout*). *P. pulchrina*, Haw., Chiswick, once in a house (*Sich*); Harefield, once (*Wall*); Harrow-Weald, common on geraniums (*Rowland-Brown*). *P. festucæ*, L., Clapton (*Bacot*).

Subf. *Heliothinæ*.

Heliaca tenebrata, Scop. (*arbuti*, Fb.), in hay meadows in many places (*Godwin*); Mill Hill, plentiful on the common, several in the orchard (*South*); West Hampstead (*Watts*); fields at Finchley side of Bishop's Wood (*Vaughan*); Harefield, one, 17th May, 1890 (*Wall*); Highgate Woods (*Shepherd*); Old Oak Common (*Mera*); plentiful at Willesden (*Adye*).

Heliothis peltigera, Schiff., see 'Naturalist,' 1885, p. 347.

Poaphilidæ.

Phytometra viridaria, Clerck., "Isleworth" (*Meyers*, reported to *F. Fenn*).

Euclidiidæ.

Euclidia mi, Clerck., Old Oak Common (*Godwin*); Mill Hill, several on the common (*South*); Ruislip and Pinner, 10th June, 1883 (*Watts*); Harefield, moderately common (*Wall*); Harrow-Weald (*Rowland-Brown*); plentiful at Willesden (*Adye*). *E. glyphica*, L., Pinner Woods, 3rd June, 1883 (*Watts*); Harefield, common (*Wall*); Harrow-Weald (*Rowland-Brown*).

Catocalidæ.

Catocala nupta, L., Hampstead Heath, Regent's Park, Hyde Park, Maida Hill, &c. (*Godwin*); Mill Hill, at sugar (*South*); Chiswick (*Sich*); Bedford Park (*Miss E. Sharpe*); Isleworth (*Meyers*); Kentish Town, Highgate (*Vaughan*); Harefield, taken freely, especially in 1887 (*Wall*); Harrow-Weald (*Rowland-Brown*); Hammersmith (*Mera*); Ealing (*Adye*); Clapton (*Bacot*); Bloomsbury (*British Museum*).

C. fraxini, L., Regent's Park (*Knaggs*, Ent. Ann. 1871).

Boletobiidæ.

Boletobia fuliginaria, L., Thames Street, London (*Wellman*, Entom. 1879, p. 225).

Herminiidæ.

Rivula sericealis, Scop., Harefield, common (*Wall*).

Zanclognatha nemoralis, Fb. (*grisealis*, Hb.), West Hampstead, common, Clutterhouse Lane (*Godwin*); Bishop's Wood, Highgate Wood (*Vaughan*); Harefield, not common (*Wall*).

Z. tarsipennalis, Tr., Bishop's Wood, Highgate Wood (*Vaughan*); Tottenham (*Prout*).

Pechypogon barbalis, Clerck, Bishop's Wood (*Shepherd*).

Hypenidæ.

Hypena rostralis, L., Bishop's Wood, Hampstead, West Hampstead (*Godwin*); Isleworth (*Ckll.*); Bedford Park (*Ckll.*); Highgate (*Vaughan*); Finchley (*Shepherd*). *H. proboscidalis*, L., Bishop's Wood, Old Oak Common, Clutterhouse Lane, Kingsbury (*Godwin*); Hampstead, Kentish Town (*Vaughan*); Harefield, very common (*Wall*); Finchley (*Shepherd*).

NOTE.—On p. 121, the locality for *Senta maritima* is omitted; it is Hammersmith Marshes (*Newman*). On p. 158, the footnote on *P. rubricosa* should be erased, as Dr. Chapman has well shown (Ent. Rec. 1891, April, p. 13) that this insect is not a *Tæniocampa*.

Institute of Jamaica; Kingston, Jamaica, Oct. 3, 1891.

(To be continued.)

REARING *LIMENITIS SIBYLLA* AND *PARARGE EGERIA*.

By J. H. Fowler.

Of all our forest Rhopalocera, *Limenitis sibylla* is deservedly considered one of the most interesting and beautiful in its metamorphoses. Perhaps a few hints to amateurs who desire to obtain and breed it may be acceptable, especially as many who have taken the imago have never seen the species in either of the other stages; yet it is conspicuous, and easily found in any stage.

The locality where I obtain *L. sibylla* commonly every season is in the Linford enclosures, near Ringwood, which were planted about forty-five to fifty years ago, trees of that age being very suitable for the growth of the larval food-plant, the common honeysuckle. You will observe the latter twining itself upon the oaks, and sending graceful sprays to within a foot of the ground; it is in such positions I recommend searching; select plants of scanty growth; the thicker bushes are not so productive, and searching is better than beating in many respects.

The ova are deposited upon the upper edges of the leaves, and at times upon the leaf-stalk, during July; the larvæ hatch in about sixteen days and feed for a very short time before hybernating. I have never yet found a larva in winter quarters, but imagine it hybernates upon the extreme ends of the twigs, as I find in June it commences eating at the terminals and works upwards, and, by observing the bare branches, can usually detect its presence.

The larvæ when small are rather delicate, and not easily reared; the best time to collect them is from the 7th to the end of June, especially as the month advances, when they can be readily seen at a distance of several feet, and, by careful searching, the pupa can often be found spun up underneath the leaves. I have never observed the larvæ upon plants growing upon the ground, nor above eight or nine feet high.

The result of my last season's collecting has produced me above fifty perfect specimens (one slate abn.). I may add that great care must be taken to keep the pupæ suspended, otherwise cripples may be expected.

There is every prospect of *L. sibylla* being abundant next season, as I have seen the ova in profusion, some leaves having three and four upon them; and, as I did not breed a single parasite, it would seem to be a species pretty free from the attacks of such enemies, at all events in this locality.

I have refrained from describing the ova, &c., scientifically, as the earlier stages of the species appear to be well known; confining myself to the general habits of *L. sibylla* for the information of those who may wish to study for themselves its life-history.

Since writing the above a thought struck me that by careful searching I might possibly discover the larva hybernating; so with that intention I went to the Linford enclosures, and examined honeysuckle plants, where I had previously seen some ova, the result being that I found four larvæ within half an hour, which number was quite sufficient for my purpose.

The larva, which at this age is superficially very like that of *Argynnis selene*, is about an eighth of an inch long, and exactly the colour of the bark of the honeysuckle; it has a pale stripe running along each side, and, excepting in the matter of colour, I do not see the least difference from a full-grown larva, the spines, &c., corresponding.

The larva prepares a very secure winter retreat, which doubtless it constructs on the same leaf it was hatched upon. I was right in surmising twig-ends as its position. Small as it is, it has the power of spinning a very tough web, this being necessary, as its existence for some eight months is almost in mid-air, and exposed to all kinds of weather.

It hybernates upon the midrib of the upper surface of the leaf, which is attached to the main twig by a very thick and tough layer of silk, the leaf being neatly folded over from the centre, and well lined for a short distance; but the portion which is not thus treated soon decays and falls off; so in reality the whole structure is not more than half an inch long; it is tent-shaped and partially suspended, the end nearest the leaf-stalk is securely closed, whilst the other has a very small opening, close to which is the head of the larva, as it hybernates with its head towards the ground.

Upon several occasions I have looked for this larva hybernating, the reason of my non-success being that I have always searched large dead leaves that remain in such plenty about the plants, and overlooked the small and inconspicuous, but, in this connection, important portions of the plant.

Pararge egeria is one of the most abundant of the "browns" seen in the New Forest, and always to be met with in good or fair condition from April to the end of September; it is triple-brooded, and, like most species of the Satyridæ, can be easily induced to oviposit in confinement.

Procure females, and place two or three into a wide-mouth bottle containing a few blades of coarse grass, cover over with white muslin, and place the bottle in a window-sill facing the south, and within a week plenty of ova will be the result: of course, the more females kept the better, as it insures a greater number of eggs; when you have ova in plenty, remove them into a small glass, and as the larvæ emerge place them in bottles, and feed every evening with fresh grass cut up into small strips. It is surprising with what ease this species is brought to maturity.

The following notes I think will interest some entomologists, as by rearing and observing *P. egeria* I have seen it as an imago alive for twelve consecutive months, and, so far as my experience goes, it is the only British butterfly that has been seen under such circumstances; none of the Pieridæ act so, although it is well known that some of its members emerge early in the year. Undoubtedly *egeria* is a satisfactory species to rear.

In August, 1890, I secured a nice lot of females, also a few in the middle of September, from which I obtained ova in abundance, which finally produced perfect insects on the following dates, *viz.*:—Oct. 24th to 31st, 4 males; Nov., 3 males and 4 females; first females, after which time it is not worth while giving number in sexes; Dec., 7; Jan. (1891), 4; Feb., 10; March, 16; three pupæ remaining, which I preserved; at the end of April I saw specimens in the Forest, and commonly in each succeeding month to end of September, thus completing the year. The latest date I have seen it in nature was Nov. 2nd, 1887, a perfectly fresh male.

Several of the pupæ were brown, instead of the usual light green. I bred a few striking examples: one male with all the pale spots replaced with tawny, another almost unicolourous dark brown, and several very fully developed females.

I am now breeding a number of *P. egeria*, also *P. megæra*; the former is very late this season, as they have only just begun to pupate (Nov. 6th), quite the reverse of last year. Of *P. megæra* several are in pupæ, and are mostly of the black form*; I think this strange, as I bred above twenty last year, but they were all green, and it is a curious fact that all emerged by the end of

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* See Entom. 195.—Ed.

October; I expected a few to lie over until the spring. I cannot see why the pupæ should be black, as no difference in the larvæ was exhibited. I am feeding them up in a room which is heated from 8 a.m. to about 11 p.m., and under exact conditions of those I reared last season.

Ringwood, 7th Nov., 1891.

NOTES FROM CHESHIRE AND NORTH WALES.

By J. Arkle.

Continuing my notes from the catkin season (Entom. 143—145), May can be briefly described this year as a cold month, in which, with the exceptions of larvæ of *Odonestis potatoria* and *Arctia caia*, and an occasional sight of imagines of *Spilosoma menthastri*, I saw little that was entomological out-of-doors. The usual May storm occurred about the customary period, *viz.*, on the 16th and 17th, when the Welsh hills were white with a general snowfall, and people in the streets might be heard jocularly wishing each other a merry Christmas. June kept up the character of a cold summer (see Entom. 126). Larvæ of *S. menthastri*, obtained at Aberdovey in the preceding July, began to appear as perfect insects on the 13th. These included the variety with soot-coloured tips to the upper wings,—all, be it remembered, from the same batch of eggs.

On June 13th I went to Delamere Forest, in search of two species of dragon-flies, and was successful. No. 1: Head, eyes, thorax, and body bronze-blue, segmental divisions of body sky-blue—*Agrion puella*. No. 2: Head, eyes, and body ruby-red; thorax, with dorsal surface, metallic dark green—*Agrion minium*. In both species the colours are permanent, the bodies slender, and about an inch and a quarter long. Each wing bears the usual dark spot on the costal margin near the tip. This spot is much darker (black) in the case of *A. minium*. I then went to Oakmere, intending to hunt for another species on the west side of the lake. In my wanderings and digressions I forgot to steer, and so found myself on the east side. But what a lovely scene! sylvan shades and grassy hillocks, on which the blue of the wild hyacinth dominated the grassy-green stretches of heather—here a long point of land reaching into the placid lake, and yellow with a short, thick carpet of golden broom—sedges, bulrushes—a wooded island far out in the centre—and pine trees circling round the lake, sheltering many an uncouth bird, strange insect, and lovely flower! Up started a dragon-fly, and at last I secured two specimens. Briefly described, the head, thorax, and body are brown, the tint being deepened to very dark brown at the head and anal segments. The wings have a brown shade, and, in addition to a very conspicuous dark brown costal spot near the tip, there is, midway on the costal margin of each wing, another still more pronounced dark brown blotch. The base of each lower wing is further ornamented with a large triangular patch of the same dark brown as the costal spots, but delicately reticulated with pale grey. The body is stout, and an inch in length. This fine dragon-fly is *Libellula quadrimaculata.*

In the Forest I came across the usual common insects—*Ematurga atomaria*, *Bupalis piniaria*, *Melanthia ocellata*, *Melanippe sociata* (*subtristata*), *Cabera pusaria*, *C. exanthemata*, *Panagra petraria*, *Macaria liturata*, *Thera variata* var. *obeliscata*, and a fine specimen of *Hylophila prasinana*, just emerged from the chrysalis. What I specially wanted in Lepidoptera, however, was *Tephrosia biundularia* var. *delameriensis*, and I secured half a dozen good specimens off the oak-trunks. The females obliged me with several batches of eggs, some of which were sent off to entomological friends, and I reared a considerable number of larvæ, which began to pupate on August 9th.

On June 20th a lot of *Mamestra brassicæ* I had bred up from the egg in the summer of 1890 for observation began to show themselves. About a dozen moths appeared *from the same brood* on Sept. 11th, 1890, and in the two or three following days. The rest lay over the winter, and appeared as perfect insects between June 20th and July 17th. These I simply turned out of the flower-pots as they emerged, thinking they would take themselves off at the approach of nightfall; but they laid their eggs first, and the consequence was that the few green things I can grow out-of-doors were attacked by a host of the caterpillars, mint and French and African marigolds being especially selected. I also bred from the egg a batch of *Noctua augur*, the caterpillars of which hybernated through the winter, and appeared as imagines by July 12th. The eggs of these insects, seen through a powerful microscope, are a sight worth remembering, especially those of *M. brassicæ*, with their irregular, blotched, purple band, and ribbed shell as of dull white china.

July was a cold wet month, so cold and wet that collecting was almost impracticable.* A lot of *Bombyx neustria* began to show themselves in the breeding-boxes on the 17th. The larvæ were kindly sent me by Mr. W. J. Kerr, who came across them in considerable numbers at Barmouth in June. This is a new insect to our district list. On or about this date I sacrificed my small number of bred *Agrotis ashworthii* in obtaining ten eggs, which turned out infertile. This experiment I am not likely to repeat. July 19th: *Dianthœcia capsincola* (larvæ taken at Aberdovey, July, 1890) began to appear. I only bred two specimens, as I failed to find *Silene inflata* in this neighbourhood for the caterpillars.* Curiously enough, on July 28th of this year, I discovered a liberal supply of the plant in the district known as Sealand (land reclaimed from the tidal Dee), and within three miles of Chester. This welcome acquaintance led to fresh discoveries, and I obtained, I believe, no less than four different species of larvæ (nearly full-fed) from the capsules—*Emmelesia decolorata*, *Eupithecia venosata*, *D. carpophaga*, and *D. cucubali*. The most curious thing in this curious season has been the free occurrence of really good larvæ. *Bombyx rubi*, *B. quercus*, and *S. fuliginosa*, in the larva-state, have been abundant in the Isle of Anglesey, and, close to Chester, I more than once came across caterpillars of *Smerinthus ocellatus*, *Dicranura furcula*, *D. bifida*, and *D. vinula*—the latter frequently—while I never remember seeing such numbers of *S. populi*.

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* I tried sugaring for two or three nights, but as the result was nothing but snails, slugs, and earwigs, I gave it up.—J. A.

On Aug. 8th, a dull, cold day, I went to Delamere Forest. Lepidoptera were scarce, except *C. populata*, fresh from the chrysalis, which rose from the ferns as I brushed through them; and the pretty "cowslip-yellow" *Xanthosetia hamana*. Oak-beating was a failure, but from birch I got larvæ of *Acronycta leporina*, *A. psi*, and *Tæniocampa stabilis*. I bred a large number of the last-named larvæ from moths taken in the spring, as the insects show considerable variation in the general colour of the wings; but the caterpillars exhibited a very close resemblance to each other. I also took a strange, dull green caterpillar off bilberry, with dark, smoky green V-shaped marks on each segment. Growing out of a hedge in the village, I was surprised to find a solitary plant of *Silene inflata*. Rain came on early in the afternoon, and put a stop to further work.

On Aug. 9th, a male *B. quercus*, var. *callunæ*, in which I understand the interior dark brown of the lower wings ends in a curved point on the anal angle, emerged from a larva brought to me in June. Another caterpillar received at same time spun up August 27th, and is now lying over the winter.

On Aug. 29th, a search for larvæ on the sallows, &c., in Caughall Lane—my chief hunting ground in the spring—proved a failure. I was rewarded, however, with a nice series of *Ephippiphora populana* (*ephippana*), a beautiful little Tortrix with dark purplish upper wings ornamented with a conspicuous, central, cream-coloured blotch.

In September I was much away from home; but on the 5th I again visited Delamere, and beat larvæ of *Lophopteryx camelina* (abundant this year), *Drepana falcataria* (*falcula*), *Notodonta dromedarius*, *Dasychira pudibunda*, and *Amphidasys betularia* from oaks and birch. My special object was to beat larvæ of *Hadena adusta* for a correspondent, off bog-myrtle, on Hatchmere Moss; and, in spite of the fire which apparently exterminated many species here two years ago, I succeeded. Larvæ of *H.*

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* These larvæ will eat seed-capsules of pinks and sweet-williams.—Ed.

rumicis and *H. pisi* fell freely into my umbrella as well, but no *Nemeophila russula*! Two years ago I beat the latter into the umbrella by the half-dozen. The day was dull and threatening, but a fine specimen of the dragon-fly, *Libellula scotica*, fell into the umbrella from the sweet gale (bog-myrtle). The following is a description:—Expanse of wings, 2 in.; body, from thorax, 1 in., and slender. Head yellow; eyes brown. Thorax and body yellowish ochreous brown, black underneath. Legs black. A dark, almost black, triangular frontal mark on thorax; sides of thorax light yellow, with black boundaries and centres. Wings colourless, except the base, which is suffused with yellowish ochreous colour; a black, rectangular costal mark near each tip; nervures delicately pencilled in black. The only lepidopterous insects I could beat up on the Moss were *C. testata*, and a few faded *Crambus margaritellus*.

In early September and late August I found larvæ of *Orgyia antiqua* a pest in the Grosvenor Park, Chester. Some of the bushes of the holly-leaved barberry (*Mahonia aquifolia*, American flora) had scores and hundreds of them, together with cocoons and pupæ. I bred a large number of the moths, and it was amusing to see out-of-door males assembling in the daytime on the breeding box when the females appeared.

On Sept. 7th, a fine but unusually pale larva of *A. alni* was brought to me for identification by Mr. J. Lyon Denson, a Chester fellow-naturalist. It had been taken off a brick wall, in the suburbs, by a boy. In spite of diligent search, no more were to be had. On Sept. 8th Mr. Denson and I worked the gas-lamps with a ladder. We took several *Eugonia alniaria* (*tiliaria*), *C. truncata* (*russata*), with vars. *perfuscata* and *immanata*, *Crocallis elinguaria*, a fine *Geometra papilionaria*, *Noctua rubi*, *Neuronia popularis*, *Triphæna ianthina*, *Hydrœcia micacea*, and other common moths. We had now a few days of hot weather, and the butterflies, as if determined to share them, appeared in fair numbers; *Pieris brassicæ*, *Epinephele tithonus* (very late), with small coppers and common blues. I saw nothing of *Vanessa urticæ*, *V. io*, or *V. atalanta*, although I found larvæ of the first two common enough on nettles by the river-side, in July.

On Oct. 3rd I went to Delamere Forest, chiefly to get rid of a "cold," possibly influenza. Experience showed me that the odour from the firs is most beneficial in such cases. Making every allowance for "faith-healing," if there be such a thing, I was better next day, and thoroughly well the day after. Beating Scotch firs showed larvæ of *B. piniaria* to be in force, while those of *L. camelina*, full-fed, still lingered on birch. But the ferns and undergrowth were rapidly turning yellow, showing up, in startling contrast, the greens of the mosses and the sombre shades of the Scotch firs. We had, generally speaking, a cold, wet October, with high gales; and I packed away my settingboards, thinking collecting was over for the year. The night of Nov. 2nd, however, tempted me to try the gas-lamps again; and, to my surprise, I took four *Miselia oxyacanthæ*, a moth I never saw before in the district, although it is marked "common" on the list; five *Himeria pennaria*, two *Diloba cæruleocephala*, one *Asteroscopus sphinx* (*cassinea*), and one *Calymnia pyralina*, all in capital condition. *Cheimatobia brumata*, *Hybernia defoliaria*, *Oporabia dilutata*, and *Anchocelis pistacina* were also well represented. The nights of the 3rd, 6th, and 7th saw me at the lamps again, of course with a ladder, when all the insects just mentioned occurred freely, with the exceptions of *M. oxyacanthæ* and *A. pistacina*, which disappeared on the 7th. The weather broke up again on the 8th, with storms of wind and rain; and to-night, as I write, it is difficult to believe I was moth-catching only a few hours ago.

Chester, Nov. 9, 1891.

CURE FOR THE RAVAGES OF THE LARVÆ OF *NEMATUS RIBESII* AND *ABRAXAS GROSSULARIATA*.

In the interesting lecture delivered this month by Mr. G. C. Bignell, F.E.S., before the members of the Plymouth Institution, on "The Hessian Fly and other Insects injurious to Farm and Garden Produce," he mentions those two pests, *Nematus ribesii* and *Abraxas grossulariata*, which attack the currant and gooseberry bushes. The larvæ of the latter have been most abundant this season, and many are the loud and deep complaints I have heard from neighbours.

It may interest your readers to hear of an effectual remedy which does not seem generally known, judging from my experience. I first saw it used in Lanarkshire, where large quantities of small fruit are grown for jam-making, and to supply the Glasgow markets:—Take as much hellebore as would cover a penny, and mix it well in one gallon of water; syringe the bushes. When the weather is dry, the particles of hellebore will stick to the leaves, and the larvæ are poisoned at once on eating them. I have on several occasions entirely destroyed swarms of larvæ in twelve hours. If rain does not fall after this, the bushes should be syringed well with clean water.

The pupæ of the sawfly would no doubt be destroyed by the method recommended by Miss Ormerod, but it would be heavy labour when the grower has many acres of fruit trees. I therefore think it is desirable to exterminate as many in the larva-state as possible. I have never heard of any inconvenience caused by the use of hellebore in the manner I suggest. *Abraxas grossulariata* larvæ are most abundant in May, when the fruit is small, and gives ample time for rain before picking; one heavy shower will wash every particle of hellebore from the leaves and fruit. If no rain, the syringing with clean water will prove effectual; at least that is my experience during the many years that I have used it.

If, however, there is any objection to the use of hellebore another remedy, perfectly harmless, is as follows:—Syringe the bushes with clean water, and when wet dust them with fine sifted coal-ash; it is advisable to throw this with the hand up under the foliage as much as possible, leaving a layer of an inch deep on the ground under the bushes. This is a west-country remedy, and is only effectual during dry weather.

John N. Still.

Broadleigh Down, near Tiverton, Oct. 26, 1891.

The use of hellebore in the way advocated by Major Still being new to us, we referred the matter to Miss Eleanor Ormerod, who has kindly written concerning it as follows:—

"I cannot at this minute recall any information being sent of the use of hellebore in fluid form (*i. e.*, as a syringing) as a means of destroying gooseberry caterpillars, but so long ago as 1879 I had notes of it as being exceedingly effectual if applied as a dry dusting. But also the effects on the eaters of the gooseberry fruit might be, and in one case were reported to have been, so extremely serious, in consequence of the fruit not being cleared of the poison before it was made into a tart, that I have been most careful as to bringing this remedy forward. I noticed it in the first edition of my 'Manual,' but with cautions. Of course, when applied in solution, such a much smaller amount is given that the risk is greatly lessened; still I do not like to have anything to do with recommending poisonous applications where there is risk of their remaining on either fruit or leafage to be used for consumption of man or farm-stock. There is no difficulty in keeping down gooseberry sawfly attack, if the surface soil is skimmed off during winter to the depth at which the little cocoons lie, and this infested soil is carried away and *destroyed*. This is a regular working gooseberry-grower's remedy for the sawfly attack, and I should say that it would be just as serviceable (with a little adaptation) in getting rid of the caterpillars of the other gooseberry pest, the "magpie moth." If the ground where they are wintering is removed, and an eye given to the bushes to remove such as may be hanging in their leaf-cradles, it makes a deal of difference in amount of attack."

Eleanor A. Ormerod.

Torrington House, St. Albans.

NOTES ON THE SYNONYMY OF NOCTUID MOTHS.

By Arthur G. Butler, F.L.S., F.Z.S., &c.

(Continued from p. 266.)

Pyrrhia, *Hübn.*

Pyrrhia umbra.

Noctua umbra, Hufnagel, Berl. M. iii. p. 294 (1767).
Pyrrhia exprimens, Grote (not Walker), see Check List, p. 36, n. 97.

Europe, Dharmsala, United States. Coll. B. M.

Pyrrhia exprimens.

Heliothis exprimens, Walker, Lep. Hist. xi. p. 687, n. 13 (1857).
Pyrrhia angulata, Grote (see Check List, p. 36, n. 998).

United States. Coll. B. M.

Although it is just possible that the *P. exprimens* of Grote may prove to be locally worthy of being called var. *roseilimbata*, on account of the tint of the borders of the secondaries, the *P. exprimens* of Walker cannot, unfortunately, be distinguished from *P. angulata*.

Schinia, *Hübner*.

There is no possibility of rejecting this genus, as, even according to Grote himself, the three species associated by Hübner under *Schinia* are congeneric. I fail to see where the absurdity of its adoption in preference to *Lygranthœcia* comes in; moreover, Grote tells us that the *marginata* of Haworth is the type of his *Lygranthœcia*, in which case the latter genus will be a synonym of *Pyrrhia*.

Schinia trifascia.

Schinia trifascia, Hübner, Zutr. Exot. Schmett. figs. 33, 34.
Anthophila lineata, Walker, Lep. Het. xii. p. 830, n. 16 (1857).

United States. Coll. B. M.

Walker's description of the primaries is most eccentric. He calls these wings whitish, with four æneous bands; this description reversed would be more correct, the bronze colouring occupying the greater part of the surface.

I cannot comprehend the synonymy of "*Lygranthœcia*" *separata* as given in the Revised Check List, and which stands as follows:—

separata, Grt.
Var. *acutilinea*, Grt.
Var. *walsinghami*, Ed.
Var. *balba*, Grt.

It appears to me just possible, though very improbable, that the first two may be forms of one, and the last two of a second, species; the markings of *Schinia separata*, however, differ throughout from those of *S. acutilinea*. *S. walsinghami*, of which we have twelve examples from Lord Walsingham's collection, is a perfectly constant orange-tawny form, and stood alone in that collection; all the specimens were obtained at the "Sheep Rock." *S. balba* differs chiefly from the latter in its more olivaceous colouring and the white external border of primaries. No constant local form should be termed a variety.

ANARTA, *Ochs.*

Anarta richardsoni.

Hadena richardsoni, Curtis, Append. Ross. Narr. 2nd Voy. p. 72, pl. A, fig. 11.

Anarta septentrionis, Walker, Lep. Het. xi. p. 700, n. 10 (1857).

Lapland, Grinnell Land, Nova Zembla. Coll. B. M.

Under this species Walker placed specimens of a form with obscure markings and smoky secondaries, which I believe to be entirely distinct.

Anarta quieta.

Noctua quieta, Hübner, Eur. Schmett. Noct. fig. 485.

♂ *Anarta constricta*, Walker, Lep. Het. xi. p. 701 n. 11 (1857).

♀ *A. rigida*, Walker, *l. c.*, n. 12 (1857).

Lapland, Finmark, Arctic America. Coll. B. M.

A. kellogii is nearly allied to *A. melanopa*, an example of which from California was in Grote's collection; it, however, appears to be distinct. *A. nivaria* is very close to *A. impingens*.

MELICLEPTRIA, *Hübn.*

I cannot think that my friend Grote has improved this genus in his Revised Check List by uniting *Adonisea* with it, or by turning *M. prorupta* and *oregonica* into *Melaporphyria;* as to *M. oregonica* or *oregona* being synonymous with the European *Heliothis ononis*, it is quite out of the question. The resemblance between the two species, when examined side by side with an inch lens, is seen at once to be superficial; the pattern does not at all correspond, and the structure of the palpi differs considerably. "*Melicleptria*" *hoyi*, Grote (Check List, p. 36, n. 960), is "*Anarta*" *brephoides*, Walker (Lep. Het. xi. p. 702, n. 13); with the latter, Walker associated a species intermediate in pattern between *M. prorupta* and *oregonica*, and bearing a label with the legend, "513 or 412. *Agarista simplicicornis*," but with no indication of locality. It is labelled in the same handwriting as one of the other five examples (= *M. hoyi*). The pectinated antennæ at once remove *M. hoyi* from *Melicleptria* to the neighbourhood of *Brephos*.

ADISURA, *Moore.*

Adisura? moribunda.

Leucania moribunda, Guenée, Noct. i. p. 95, n. 150.
L. invaria, Walker, Lep. Het. ix. p. 111, n. 78 (1856).

Sydney. Coll. B. M.

We have both type specimens of this species, so that *L. moribunda* is clearly proved to be from Australia.

I think *Heliothis lucilinea*, Walk., is best placed in this genus; it can hardly be a true *Heliothis*.

CURUBASA, *Moore.*

This genus, *Adisura* and *Pradatta* appear to me to be much confused. *Adisura* is evidently an offshoot from *Heliothis*, and has the same robust body, the general ground colour of pale *H. armigera*, the dusky border to the secondaries often showing a pale spot as in that genus. I would place under it *Leucania moribunda* and the allied *Pradatta artaxoides*. In *Curubasa* the body is less robust, the palpi are more slender, the wings are opaque and glossy, with rose-coloured costal and internal borders. In *Pradatta* the palpi are considerably shorter than in *Adisura*, the antennæ of the males much thicker in the type (though this difference does not hold with all the species), and the subcostal branches of the secondaries are emitted from an acute point, due to the strongly angulated discocellulars; the wings are almost as glossy as in *Curubasa*, and are longitudinally streaked with pale rose, after the manner of marking of a *Leucania*. Of the named species in the Museum I refer to *Curubasa*, in addition to the type (*C. beatrix*), *Leucania alaroides*, *Pradatta bimaculata*, *P. decorata*, and *Leucania aureola*.

Curubasa marginalis.

Anthophila marginalis, Walker, Lep. Het. xii. p. 830 (1857).
Adisura dulcis, Moore, P. Z. S. 1881, p. 368, pl. xxxvii. fig. 20.

Campbellpore. Coll. B. M.

In the type, which is faded, the cilia of the primaries are entirely pink, as in Moore's description of his *Adisura dulcis*, whereas in our Campbellpore specimen they are tipped with white. This appears to me to be probably a sexual character, but, even if not, I do not believe it to be of specific importance; and in any case Moore's *C. dulcis* is Walker's *A. marginalis*.

HELIODES, *Guén.*

It is impossible to guess by what method Dr. Staudinger has decided, to his own satisfaction, to fix the types of genera. His first action appears to be to ignore the author's typical species; his second action to substitute for it a species originally admitted, with hesitation, by the author into his genus. M. Guenée, when describing his genus *Heliodes*, indicates two species, *rupicola* and *arbuti*, but says that he has never seen a specimen of the former; thus indicating the latter as his type. In his Nat. Hist. Lep. Noct. ii. p. 197, he distinctly marks *H. arbuti* as type of *Heliodes*, and omits *rupicola* from the genus. Dr. Staudinger takes the latter as type of *Heliodes*, and thus applies Guenée's generic name to a group for which it was not intended, with a type unknown to the author of the genus. Anything more opposed to practical common sense can hardly be imagined.

LEUCANIIDÆ.

BITYLA, *Walk.*

I refer this genus to the group allied to *Nonagria*.

Bityla defigurata.

Xylina defigurata, Walker, Lep. Het. Suppl. 3, p. 756 (1865).
Bityla thoracica, Walker, *l. c.*, p. 869 (1865).
New Zealand. Coll. B. M.

(To be continued).

ENTOMOLOGICAL NOTES, CAPTURES, &c.

RE-UNION BETWEEN THE SAME MOTHS.—Mr. J. N. Young's note on this subject (*ante*, 268) is of especial interest, following, as it does, so closely on a parallel case mentioned by Mr. Eustace R. Bankes (E. M. M. n. s. ii. 274), in which the species affected was *Ephestia kühniella*, and one exactly similar that came under my own notice in 1889, in which a bred male and female *Spilosoma mendica*, observed in cop. at 8 a.m. on May 25th, were found in the evening of that day to have separated, and ova to have been deposited, and on the following morning, at the same hour, they were again found paired, more ova ultimately resulting. But the question that these records suggest is whether a second act of pairing is frequent in wild Lepidoptera, and, in fact, necessary for the due fertilisation of the ova contained in the female? It was a saying with many of our older collectors that if you could take "a pair in cop." you were pretty sure of a "fresh female," which would appear to imply that only freshly-emerged females paired. But recent observation induces me to believe that this is by no means so, and as an instance I may mention the following:—During a brief stay at Eastbourne in August last I found *Lycæna corydon* very commonly, and among them a great many pairs in cop.; in some cases both male and female, and in others one or the other, were, without doubt, quite freshly emerged; but in a large number it was only too evident that both had been on the wing for a considerable time, and it is hardly to be supposed that with both sexes flying so commonly either would become worn before finding a mate.—R. ADKIN; Lewisham, November, 1891.

ABNORMAL EMERGENCE OF DEMAS CORYLI. — On looking over my breeding-cages yesterday, I was surprised to see in one of them a fine freshly-emerged female of *Demas coryli*. The larva from which it was reared was received, with others, from the New Forest in August last; the batch fed well together, and they commenced to spin up on Sept. 6th, completing that operation by the 16th. Both larvæ and pupæ were kept out of doors. This species is, I believe, somewhat erratic in its times of appearance, a few larvæ in a brood sometimes feeding up more rapidly than their fellows in the spring, and producing imagines in August and September; but what can have induced this misguided creature to quit its pupa in this dull damp weather in the middle of November is beyond my comprehension.—ROBERT ADKIN; Lewisham, Nov. 16, 1891.

STAUROPUS FAGI PARTIALLY DOUBLE-BROODED.—From ova of *Stauropus fagi*, placed in sleeves on oak and apple in June last, I have reared four imagines, the first emergence being on Steptember 11th, the last on October 28th. In none of its stages had *fagi* been subjected to artificial heat. These facts have led to an outdoor search in its known haunts, with the result that three were taken during the week ended Saturday last.—J. CLARKE; Reading, November 9, 1891.

VARIATION OF ZYGÆNA FILIPENDULÆ.—Referring to your article on variation of *Z. filipendulæ*, I would say that the var. which I have named *cerinus* is not of very unfrequent occurrence here, and has been recorded more than once, I think. In some years several will be met with, and then it will not be seen for a long time. Another form also occurs here, in which the brilliant crimson of the spots and hind wings is replaced by a dull pinkish red. Of this form I have both bred and taken examples (Y. N. vii. 192), and in 1889 my friend Mr. Gardner bred four or five. I have two examples of the form with only five spots on the upper side, but they both have six on the under side.—JOHN E. ROBSON; Hartlepool, Oct. 7, 1891.

PSYCHE PULLA.—In answer to Mr. Briggs (Entom. 243), I should say that, as a rule, the larva of this species certainly does *not* hybernate full-fed; I have taken them in the spring, and had to feed them for over a month. My dates for the emergence of the perfect insect (this year) were June 22nd to July 22d, or thereabouts.—LOUIS B. PROUT; 12, Greenwood Road, Dalston, N.E., Oct. 10, 1891.

PRESERVING PUPÆ THROUGH THE WINTER.—As we have now reached a period when the ripest time for pupæ is just over, and are thinking of the best means by which they may be preserved, I can recommend a plan which I have myself tried for two years with very fair success, and, although it has probably been used by other entomologists, I have not heard of its being in general practice. My plan is this: get one of those improved larva breeding-cages, and, having taken away the sliding bottom, insert a piece of perforated zinc or wire gauze, lay the pupæ on this on damp moss, and fill the tins below with water; these, I may say, should be refilled once a month. In a cage such as this the pupæ may be kept in an ordinary living room, as the water by its evaporation will keep them from drying up, or emerging before the proper time.—J. LEWIS BONHOTE; Rev. W. D. Bushell's, Harrow, Nov. 8, 1891.

MATERIAL WANTED FOR PHYSIOLOGICAL INVESTIGATION.—I am very greatly in want of a number of dead pupæ and larvæ for a series of physiological investigations in which I am engaged, and shall be much indebted to *any readers* of the 'Entomologist' who will be kind enough to forward me such material. Since presumably every one who breeds Lepidoptera has to reckon with a large percentage of mortality in his breeding-cages, and since it is quite indifferent to me *how common* the species may be, it seemed that by thus making known my wants I might obtain an abundant supply of material for the work in hand. I will only add a request that any larvæ or pupæ sent may be *named* as closely as possible: that, *e.g.*, if the species be unknown, the genus may be given; or, if even the genus be unknown, that the family be stated: but, above all, an incorrect or doubtfully correct naming should *emphatically* be avoided.—F. H. Perry Coste; Analytical Laboratory, 7, Fowkes Buildings, Great Tower Street, E.C., Nov. 16, 1891.

Sophronia emortualis.—I have the specimen noted as sold at Stevens's (Entom. xxiii. p. 246). It was in Harper's collection. Locality said to be near Marlow, Bucks.—J. B. Hodgkinson; Ashton-on-Ribble, October 22, 1891.

Vanessa antiopa at Balham.—A friend informs me that on the 10th inst. a specimen of *Vanessa antiopa* was seen by the Rev. Dr. Edghill at Balham railway station, while he was waiting the arrival of a train. A good view of the insect was obtained as it flew the entire length of the station between the platforms and only a few feet above the rails, and passing close by him. I understand the Doctor is well acquainted with *V. antiopa*, as he has both seen and taken several on the continent. Curiously enough I saw one within 100 yards of the same spot in August, 1887, as recorded at the time.—F. W. Frohawk; September, 1891.

Note on Acherontia atropos.—On October 22nd I had a fine male specimen of *Acherontia atropos* brought to me, which had been found in a garden in Hastings Road, Maidstone. I had the pleasure of hearing the peculiar cry emitted by this insect several times. Once while setting it I heard the sound, but very faintly, when I moved the thorax, but as it was not repeated I could not ascertain from whence it came.—H. Sandlin; 28, Hastings Road, Maidstone, November 3, 1891.

Sphinx convolvuli in 1891:—

Kent.—On Monday, the 7th September, while mothing at a bed of sweet-scented tobacco-plant in my garden at Ramsgate, I captured two specimens of *Sphinx convolvuli.* I saw a third, but was unable to capture it, as I was engaged in bottling one. The two I caught proved to be a male and a female; the latter in good condition, but the male rather worn.—T. D. Willson; 22, Halford Road, Richmond, Surrey, Nov. 1891.

Lancashire.—On the 22nd of August I saw two *Sphinx convolvuli*, one of which I caught. It was hovering over the flowers of *Nicotiana affinis.* My brother has since seen several specimens, but failed to capture any.—G. A. Booth; Fern Hill, Grange-over-Sands, October 20, 1891.

Hants.—*Sphinx convolvuli* has been common here this season. I have taken ten specimens.—J. H. Fowler; Pontner, Ringwood, Nov. 7, 1891.

Deilephila livornica near Norwich.—A very fine specimen of *Deilephila livornica* has been brought to me for identification. The insect, which is in very fair condition, was taken by a collector in the early morning at rest near an electric-lamp, at Carrow, adjoining this city, early in September last. The specimen exceeds in expanse by a quarter of an inch that figured in 'Newman's British Moths.'—R. Laddiman; 25, Lower Hellesdon Road, Norwich, November 5, 1891.

Drepana harpagula (Platypteryx sicula) at Clifton.—As I believe that *Platypteryx sicula* has not been recorded for several years past, I am pleased to note that the insect is still to be found, though rarely and with difficulty, in its old haunts in Leigh Woods, near Bristol. Mr. W. H. Grigg, the former captor of so many specimens, was good enough to accompany me to the locality on 12th September in search of the larvæ, and our afternoon's work resulted in four, three of which fell to Mr. Grigg's tray, but which he kindly presented to me. All of them fed-up well, and have pupated. A day or two after our capture, Mr. W. K. Mann obtained a larva from the same group of trees.—G. C. Griffiths; 43, Caledonian Place, Clifton.

I am glad to be able to record taking a single larva of *Platypteryx sicula* [*Drepana harpagula*] on September 14th in Leigh Woods, Clifton. This species, although well worked for, has not been taken for four years.—W. K. Mann; Clifton, Bristol.

Heliothis armiger in the Hastings District.—In July last I found a larva of this species on tomato. It changed to the pupa the same month; the moth emerged early in September, and was kindly determined by the Rev. E. N. Bloomfield, of Guestling.—H. W. Ford-Lindsay; The Shrubbery, Clive Vale, Hastings, November 2, 1891.

Cucullia absinthii in Devonshire.—In reply to Mr. Bartlett (*ante*, 245), I beg to say that from 1874 to 1878 I used to take the larvæ of this species in the greatest abundance at Slapton Lea, and I have met with it elsewhere, both in South and North Devon, wherever its food-plant occurred, but never in such profusion as at Slapton.—Gervase F. Mathew; Lee House, Dovercourt, November 9, 1891.

Acherontia atropos at Gosport. — Whilst collecting the other evening in a brick-field near Gosport, a scholar of St. Matthew's Boys' School, Gosport, captured a fine specimen of *Acherontia atropos*. — W. H. Mackett; St. Matthew's School, Gosport, Oct. 12, 1891.

Larvæ of Phorodesma smaragdaria.—On Saturday, Sept. 12th, hearing that *Geometra* [*Phorodesma*] *smaragdaria* larvæ were to be found commonly, I went down with a friend to the Essex salt-marshes, and, though we had only a little over two hours to search, we succeeded in finding 53. I know of some 260 specimens that have been taken there this autumn.—R. E. James; Chesterville, Hornsey Lane, N., Oct. 7, 1891.

Larvæ of Apamea ophiogramma in Nottingham.—In my garden I took a number of larvæ of *Apamea ophiogramma* in September (kindly identified by Mr. South), feeding on ribbon-grass. They feed at night, creeping in the daytime down the hollow stems of the grass, or hiding near the ground. They buried in cocoa-fibre about October 14th, but had not changed ten days after, so may be hybernating. I believe that this is the first time the larva has been taken in the Midlands, but it may prove to be common when hunted for at the right time, as I have found it in two other gardens in the village.—Douglas H. Pearson; The College, Chilwell, Nottingham.

Larvæ of Hadena pisi.—With reference to the food-plant of this species (*ante*, pp. 245, 269), I do not think that it is very particular, but will feed on a variety of shrubs and low plants. Some years ago, in the north of Devon, I found them in great numbers, feeding perfectly exposed upon foxglove, and I have seen them on hazel, bramble, broom, dock, knot-grass, and other plants. With regard to bracken, although I have frequently taken them upon it, stretched at full length enjoying a warm sun, I never found that they had much partiality for it as a food-plant in confinement, and used to consider that they had merely crawled up from some other plant. Last September I took several at Halifax, Nova Scotia, feeding upon alder and birch. — GERVASE F. MATHEW; Dovercourt, Nov. 9, 1891.

LARVÆ OF LARENTIA DIDYMATA.—At Instow, North Devon, I used to find the larvæ of this species in a shady lane, feeding upon the flowers of primrose; when the flowers were over they attacked the tender leaves, eating numerous holes in them. I never found them feeding upon anything else, although there was plenty of sorrel growing in the same lane.—GERVASE F. MATHEW. [See also p. 245.]

PUPATION OF ACRONYCTA ALNI.—With reference to Mr. T. B. Jeffreys note (Entom. 367), I may state it was my good fortune to take a larva of *Acronycta alni* at the foot of an elm, near here, on August 22nd. It was evidently full-fed, as it would not touch anything I placed in the cage for it to feed upon; and on the 30th, after appearing to sicken away, I was gratified to find it had pupated, and that without spinning any web at all. Probably it would have entered a stem for pupation had there been one large enough in the cage; but, being rather careless in this matter, I had not provided the accomodation. A friend of mine, Mr. T. L. Howe, also found a larva of *alni* in this district during the autumn, which acted and pupated exactly similarly to mine.—G. A. BIRKENHEAD; Downs View, Penarth, near Cardiff, November 10, 1891.

NOTES ON LEPIDOPTERA FROM VARIOUS LOCALITIES.—I took a single larva of *Aplecta occulta* this year on bog-myrtle in Inverness, and bred a very fine black form. I have done nothing very exceptional this year, but obtained a long series of *Sesia sphegiformis* from pupæ. Larvæ of *Notodonta dromedarius* I got not uncommonly on alder in Sligo, but they died off terribly; I also found there a male *Hydræcia nictitans* in cop. with female *Noctua xanthographa*. *Agrotis saucia* is appearing at sugar now rather freely, and the usual common lot in plenty. *Schœnobius mucronellus* I took on a pond here, which may be of interest, as Stainton, I see, only gives the Fens as a locality.—JOHN E. EASTWOOD; Enton Lodge, Witley, Surrey, Oct. 13, 1891.

LEPIDOPTERA AT GAS LAMPS.—Some new gas-lamps here have proved very productive this season. In September *Ennomos tiliaria* were fairly plentiful and in good condition, and *Gortyna flavago* very plentiful. I also took *Trichiura cratægi* (two), which were new to me, *Scotosia dubitata*, *Cidaria testata* and *C. miata*, *Miselia oxyacanthæ*, *Hydræcia micacea*, &c. In October, *Tapinostola fulva*, *Oporabia dilutata*, *G. flavago*, &c. *Diloba cæruleocephala* and *Cheimatobia brumata* are now swarming.—DOUGLAS H. PEARSON; The College, Chilwell, Nottingham, Nov. 6, 1891.

LEPIDOPTERA IN THE NEW FOREST, 1891.—Saturday, May 30th, found me on my way to Brockenhurst, to join my cousin, Mr. Ogden, who had gone down there on the previous evening. The prospect in London was not promising, as the city was enveloped in a thick black fog the whole morning. This, however, gradually disappeared as I got further on my way, and, on arriving, I was pleased to hear that the weather had been all that could be desired from an entomologist's point of view. This fine weather continued throughout the whole of our stay, with the exception of a heavy rainfall during the Thursday night, and a dull morning on the following Saturday. The weather being in our favour, we were able to make the most of our time, and were very fairly successful. The usual common spring butterflies, *Argynnis euphrosyne*, *Gonepteryx rhamni*, *Pyrarga egeria*, &c., were all very plentiful, with the exception of *Euchloë cardamines*, of which very few specimens were seen. *Argynnis selene* had not yet turned up, and *Thecla rubi* only occurred very sparingly, only six specimens in all being taken. *Nemeobius lucina* was exceedingly local, but plentiful where found; whilst *Hesperia malvæ* and *H. tages* turned up everywhere. Beating proved to be more successful than anything else, and by it we obtained, besides many other commoner things, *Ephyra punctaria*, *E. trilinearia*, *Corycia taminata* (local), *Halias prasinana*, *Lithosia aureola*, *Platypteryx falcula* and *P. lacertula* (both from birch), *P. hamula* (from birch and oak), and *P. unguicula* (from beech), all commonly; whilst *Ephyra pendularia*, *Episteria heparata*, and *Arctia mendica* occurred sparingly. *Bombyx rubi* was plentiful, though local on the heaths, and *Phytometra ænea* occurred everywhere, in company with *Fidonia atomaria*, and an occasional *Anarta myrtilli*, *Boarmia cinctaria*, *Nemoria viridata*, or *Euchelia jacobææ*. Male *Fidonia piniaria* and *Thera obeliscata* were taken abundantly among the pines by beating, or flying in the sun, and among them one *Macaria literata*. At Rhinefield, on June 5th, although the rhododendrons were not in flower, *Macroglossa fuciformis* was to be found fairly plentifully, and in good condition, at blossoms of American honeysuckle, clumps of which grow here and there in the enclosure. On the same day a *Macroglossa*, probably *bombyliformis*, was seen over a patch of red rattle, in a glade of Stubby Copse. Captures at dusk were very few, but among them I might mention *Numeria pulveraria* and *Hypsipetes ruberata*. Besides the insects above mentioned, a nice fresh specimen of *Epione advenaria* was taken flying in the sun, and two *Lobophora hexapterata*, one of them on a water-pipe on Brockenhurst Station. Larva-beating resulted in *Catocala promissa*, *Liparis monacha*, *Halias quercana*, *Boarmia roboraria*, *Cleora lichenaria*, *Himera pennaria*, *Agriopis aprilina*, and *Hemithea thymiaria*. Searching with a lantern after dark resulted in *Triphæna fimbria* larvæ, and in the daytime *Argynnis paphia*. On Saturday, June 6th, we returned home about midday, having had a most enjoyable visit, and very well satisfied with the results.—Russell E. James; Chesterville, Hornsey Lane, N., Oct. 7, 1891.

Seven Days' Larva-beating in the New Forest.—Implement, the Bignell Beating Tray. Aug. 5th.—Larvæ: from oak, *Notodonta trepida* (1), *N. dodonæa* (3), *Stauropus fagi* (1), *Eurymene dolobraria* (9), *Amphidasys betularia* (9), *Cidaria psitticata* (7), *Acronycta psi*, *Dasychira pudibunda*, *Odontoptera bidentata*, *Orgyia antiqua*, and other common larvæ in abundance; from beech, *Drepana unguicula* (2). Imago: *Calymnia trapezina* (2), out of oak. Aug. 6th.—Larvæ: from oak, *Tæniocampa instabilis* (2), *Boarmia roboraria* (1), *Tephrosia crepuscularia* (2), *S. fagi* (1), *N. dodonæa* (1), *Eugonia erosaria* (1), *E. dolobraria*, *C. psitticata*, *A. betularia*, common. *Eugonia angularia*, pupa spun up in oak-leaves (came out Aug. 25th). Imago: *C. trapezina*. Aug. 7th.—Larvæ: from oak, *S. fagi* (1), *N. dodonæa* (3), *Acronycta alni* (1); from beech, *Demas coryli*

(6), *D. unguicula* (2); from birch, *Acronycta leporina* (1). Imagines: *Selenia illustraria* (male and female just out). Aug. 10th.—Larvæ: from oak, *N. dodonæa* (4), *Eugonia erosaria* (1), *Tephrosia biundularia* (1): from beech, *D. unguicula* (2), *D. coryli* (8); from birch, *A. leporina* (1), *Drepana falcula* (2); from pine, *Bupalus piniaria* (1). Imagines: *Lithosia griseola* var. *stramineola* (2), *Zonosoma punctaria* (1). *C. trapezina* (4), from trees; *Melanthia albicillata* (1), from nettles. Aug. 11th.—Larvæ: from oak, *A. alni* (1), *S. fagi* (1), *E. erosaria* (1). Aug. 12th.—Larvæ: from oak, *A. alni* (2), *S. fagi* (2), *Nola confusalis* (2); from beech, *D. unguicula* (2); from alder, *A. alni* (4); from birch, *Notodonta dromedarius* (8); from wild apple, *Bapta temerata* (1), *Smerinthus ocellatus* (1). Aug. 13th.—Larva: from beech, *N. dromedarius* (1). Imagines (over heath): *Selidosema plumaria* (4), *Eubolia palumbaria* (6). N.B. *E. dolobraria*, *C. psitticata*, *A. betularia*, *E. angularia* (larvæ) have been abundant throughout. I make no mention of the Diurni captured, as they were not my object. I took some seven *Limenitis sibylla*, stated by Newman to be uncommon in that locality; *Argynnis paphia* in numbers, and of the variety *valesina* I took two specimens, and saw a third; *Gonopteryx rhamni*, common; of *Vanessa io* I only took one specimen in beautiful condition, being too early for this brood. I got two curious varieties of *Pieris napi*, of which I hope to send figures later on. I also took *Hesperia thaumas* (*linea*) sparingly, one specimen of *H. comma*, and many others. On the heaths I took *Anarta myrtilli* in plenty, and also *Phytometra ænea*, one female (impregnated) *Bombyx quercus*, and *B. rubi* larvæ in abundance.—M. FitzGibbon; Kilrock House, Howth, Ireland.

Notes on the Past Season: Delamere Forest.—Notwithstanding the very cold spring, and the miserable weather we have experienced in this neighbourhood throughout the summer, and the consequent lateness of the season generally, I have found Delamere Forest fairly productive in 1891, especially for the autumnal species. A bad beginning was made with *Nyssia hispidaria* in March, only two males and one female falling to three pairs of eyes on two expeditions. I can thus quite endorse Mr. Arkle's remarks, in the June number of the 'Entomologist' (pp. 143, 144), as to the scarcity of the insect this year, and the difficulty of "timing" its appearance. The same remark applies to *Panolis* (*Trachea*) *piniperda*; it was "knocked out of time" by the inclement season. But the Delamere *piniperda* are certainly rather erratic; I have known one to have been taken in June. *Cymatophora duplaris* put in an appearance, and *Drepana falcataria* (*falcula*) was fairly common; whilst *Hepialus hectus* abounded, fluttering over the bracken in the early dusk. In June I also took two *Melanthia albicillata* for the first time in the Forest. *Aspilates strigillaria* seemed to be scarce and late, *Anarta myrtilli* plentiful, but most difficult to net. July produced *Aplecta nebulosa*, *Noctua festiva*, *N. baia*, black form of *Xylophasia monoglyha* (*polyodon*), besides many other common species. August, I was away in Devonshire, but in September I returned to my "happy hunting ground," and took *Cloantha solidaginis*, *Noctua glareosa*, *N. dahlii* (these three, together with *M. albicillata*, have not, I think, been recorded hitherto as occurring in the Forest), *Triphæna fimbria*, *Melanthia rubiginata*, *Xanthia fulvago* (*cerago*), *Charæas graminis*, and numbers of others. Since September my sugar has attracted, among others, *Anchocelis rufina* (also unrecorded for the locality, I believe), *A. macilenta*, *Agriopis aprilina*, *Phlogophora meticulosa*, and *Himera pennaria*. *Cerastis vaccinii* has been very plentiful this year; some nights it simply swarmed, fifteen to twenty being on one patch of sugar. I would like to record the abundance of autumnal larvæ in the Forest: *Notodonta dromedarius*, *Lophopteryx camelina*, *D. falcataria*, *Hylophila prasinana*, *Hadena pisi* (which appeared to feed indiscriminately on half a dozen different plants), *Amphidasys betularia*, and various other kinds of "sticks," all in the utmost profusion. *Acronycta leporina* was rather scarce, but I succeeded in obtaining five. Comparing the past season with some previous ones, I do not consider that the year 1891 has been such a failure as the meteorological reports would have led one to expect. The abundance of larvæ seems to indicate that the weather has been less unfavourable for the hunted than for the hunter, and presages well for next year.—GEO. O. DAY; Old Bank, Sale.

NOTES FROM YARMOUTH.—The most noteworthy captures made by me during this year are as follows:—*Smerinthus tiliæ*, a specimen, the first one recorded from here, was taken in the Market Row, in July, where it was most probably attracted by the light. Two specimens of *Plusia festucæ*, one of *P. iota*, a fine *O. sambucaria*, and a *Thecla quercus* from Reedham, and *Procris statices* from Hemsby. Referring to the last-named species, Messrs. Paget, in their 'Sketch of the Natural History of Yarmouth,' say of it, "common on the Caistor Marrams." As in the case of several other insects, *Procris* [*Ino*] *statices* does not occur there now. I also netted two *Mamestra albicolon*, one rather dark, at the sallows on Caistor Road. — J. E. KNIGHTS; 41, St. George's Road, Nov. 9, 1891.

THE SEASON IN NORTH NOTTS.—The results of my season's collecting here are by no means representative of the district's entomological resources, as, besides being absent during some of the best weeks of the summer, I made no attempt at sugaring after two futile expeditions in June, and did no collecting at all in Sherwood proper, confining my operations almost entirely to Clumber Park. Still, though I only worked in this partial manner, I met with several interesting species, the first of these being *Hepialus velleda*, of which I took a beautiful female variety about the middle of June. Next evening, while making my way to the locality where I had caught this one, I noticed a hedgerow swarming with "swifts," and, finding that they were of the right sort, remained on the spot, and took a number in a very short time. On the following night a regular expedition was organised, and *velleda* had an extremely bad quarter of an hour, during which time three of us secured about forty specimens, besides turning away many more. Some of the varieties were extremely beautiful, one especially, in which the ground colour was neärly black, the silvery markings standing out with fine effect. We also got several of the unicolorous variety *carnus*, and *Hepialus lupulinus* was in evidence, but not so abundantly as *velleda*, while *humuli* and *hectus* only appeared occasionally. I found Diurni very scarce indeed, an occasional *Argynnis adippe* being all that relieved the monotony of "meadow browns," "cabbage whites," and "small tortoise-shells." I believe I once saw *Vanessa polychloros*, but could not make sure of it. Several species that have been taken here regularly for years, such as *Lycæna ægon*, *Argynnis selene*, *A. euphrosyne*, *Epinephele hyperanthus*, and *Vanessa atalanta*, did not appear at all, and I only saw one *V. io*. *Colias edusa*, of which odd specimens turn up pretty regularly in one locality, was also a failure, and the same may be said of *Gonepteryx rhamni*, which, however, is always rare here. The failure of Diurni induced me to devote the mornings to certain palings, and here again the unusual abundance of Hepialidæ was very apparent. In about half an hour I boxed thirty beautiful specimens of *Hepialus hectus* off one fence, besides *H. velleda* ad nauseam. Of the latter species, I got one lovely specimen at rest on an oak, among the roots of which the empty pupa-case was lying. Other moths found at rest were *Aplecta nebulosa*, *Euplexia lucipara*, *Agrotis porphyrea*, *Ellopia fasciaria* (very small and dark), *Plusia iota*, *Acronycta psi*, *Polia chi*, one *Agrotis ravida*, *Xylophasia polyodon*, *Triphæna orbona*, *Melanippe ocellata*, and *Charæas graminis*. Mothing in the evening produced, in addition to the above, *Gonophora derasa*, *Noctua festiva*, *Agrotis segetum*, *Mamestra furva*, *Phlogophora meticulosa*, *Hadena dentina*, *Acronycta rumicis*, *Cosmia trapezina*, *Mania typica*, &c. Various species of *Cidaria*, including *C. fulvata*, were common, while some Geometers, especially *Boarmia rhomboidaria*, *Rumia cratægata*, and *Urapteryx sambucata*, were a positive nuisance. In June *Bupalus piniaria* was abundant in Clumber Park. It was very variable, and I got some smoky forms of the female, very like Scotch specimens in appearances. One female had the right wing pale brown and devoid of markings, the ground colour of all the other wings being the usual rusty orange. On the ground frequented by this species I saw numbers of larvæ of *Euchelia jacobææ* feeding on ragwort, but no imagines were taken this year, nor did I see *Euthemonia russula* or *Euclidia mi*, both formerly common in the same locality. *Epione apiciaria*, which I once took in plenty, did not appear, but *Venilia maculata* turned up once, and *Metrocampa margaritaria* was not uncommon. One *Eurymene dolobraria* was taken and another seen, and *Abraxas ulmata* reappeared after an absence of several years. Ten years ago this moth appeared here in myriads (I have seen six on one blade of grass); but, like the "clouded yellows" of 1877, it vanished as suddenly as it came, and until last July I did not meet with it again, and then only very rarely. One *Smerinthus populi*, a pair of *Platypteryx falcula*, a beautiful specimen of *Euperia fulvago* on Sept. 11th, and one each of *Odontoptera bidentata* and *Tephrosia crepuscularia* complete our list for 1891. — E. G. ALDERSON; Worksop, Notts.

A LEPIDOPTERIST'S NOTES FROM CHICHESTER.—Taking it altogether, this has been a wretched season here for Lepidoptera almost from the commencement. I think I never remember such an absence of Rhopalocera, even of the commonest species. The only capture of any consequence that I know of was a male of *Apatura iris* by the Rev. H. Housman. The specimen, in poor condition, was taken about a mile from the city, drinking at a little puddle in the road, late in July. In June I found *Phibalapteryx tersata* (common), *Larentia* [*Anticlea*] *rubidata* (one or two), and a few *Melanippe procellata*. In July *Uropteryx sambucata* was to be met with freely, with now and then *Geometra* (*Iodis*) *vernaria*. On the 13th of this month a larva of *Cucullia chamomillæ* was brought me by the gardener, feeding on chrysanthemums. As I saw it was likely to die, I helped it by converting the larva into a preserved specimen for my cabinet. During August I took a goodly number of *Acidalia emarginata* and *Cilix spinula* (*glaucata*) from a hawthorn hedge. On 26th a specimen of *Sphinx convolvuli* was taken on a gate in one of the side streets here. On two or three evenings swarms of common Noctuæ, such as *Noctua xanthographa*, *Xylophasia monoglypha* (*polyodon*), and *Mania maura*, came to sugar, and amongst them *Agrotis puta*, *A. saucia* (1), and *Noctua plecta*. During September *Amphipyra pyramidea*, *Catocala nupta*, *Agrotis suffusa*, *Noctua c-nigrum*, *Anchocelis pistacina*, *Xanthia fulvago* (*cerago*), and one *Xylina petrificata*, from a sugared telegraph-pole, were amongst my captures. Visitors to light included *Eupithecia succenturiata, Cidaria miata, Trichiura cratægi* (1), and *Diloba cæruleocephala* commonly. On Oct. 8th a male *Sphinx convolvuli* was taken. It is somewhat small, but the very fresh condition seems to suggest its having only recently emerged, a rather late date, if such be the case.—JOSEPH ANDERSON, JUN.; Chichester.

MACRO-LEPIDOPTERA COLLECTED FROM NORWICH GAS-LAMPS. — For some years past I have been in the habit of paying occasional visits, during the months of April, August, and September, to about seventy gas-lamps situated in the southern suburbs of the city of Norwich. They have yielded no less than eighty-two species of Macro-Lepidoptera, besides innumerable Tortrices and other Micros. Had I been able to work them systematically all the year round, I believe the number of species would have been at least doubled. I publish this necessarily imperfect list in the hope that it may prove useful to other collectors:—

Bombyces.—Lithosia lurideola, Arctia caia, Porthesia similis, Leucoma salicis (a single specimen), Trichiura cratægi (a single specimen), Drepana binaria, Cilix glaucata, Pterostoma palpina (two specimens), Lophopteryx camelina, Notodonta dictæa, N. dictæoides (a single specimen), N. dromedarius (a single specimen).

Noctuas.—Bryophila perla, Acronycta aceris (in June), A. megacephala (in June), Leucania lithargyria, L. impura, L. pallens, Nonagria arundinis (a single specimen), Tapinostola fulva, Hydrœcia nictitans, H. micacea, Neuronia popularis, Charæas graminis, Mamestra brassicæ, Agrotis segetum, Noctua augur, N. xanthographa, Triphæna orbona, T. pronuba, Amphipyra tragopogonis, Tæniocampa gothica, T. incerta, Anchocelis litura, Cerastis vaccinii, Xanthia citrago (a single specimen), Calymnia trapezina, Dianthœcia cucubali (a single specimen), Polia flavicincta, Hadena pisi (June), Plusia gamma, Catocala sponsa, Xylina ornithopus.

Geometers. — Uropteryx sambucata, Epione apiciaria (rare), Selenia bilunaria, Crocallis elinguaria, Ennomos alniaria, E. erosaria, Biston hirtaria, Amphydasis strataria, Boarmia gemmaria, Ephyra punctaria, Acidalia imitaria, A. aversata and var. remutata, Cabera pusaria, Halia vauaria, Strenia clathrata, Abraxas grossulariata, Hybernia rupicapraria, H. leucophæaria, H. marginaria, H. defoliaria, Anisopteryx æscularia, Oporabia dilutata, Eupithecia oblongata, E. subfulvata, E. absynthiata, Hypsipetes sordidata, Melanthia bicolorata, Melanippe fluctuata, Anticlea berberata, Coremia ferrugata, C. unidentaria, Camptogramma bilineata, Cidaria siderata, C. miata, C. truncata, C. prunata, C. testata, Eubolia cervinata, Anaitis plagiata. — E. W. CARLIER; 36, London Street, Edinburgh.

SIREX GIGAS AT NORWICH.—In July last a fine specimen of *Sirex gigas* was brought to me, which was caught near this city. This insect is of frequent occurrence here. — R. LADDIMAN; 25, Lower Hellesdon Road, Norwich, Nov. 5.

SOCIETIES.

ENTOMOLOGICAL SOCIETY OF LONDON.—*Nov. 4th*, 1891.—Dr. David Sharp, M.A., F.R.S., Vice-President, in the chair. Major John Nathaniel Still, of Seaton, Devon, and the Junior United Service Club, Charles Street, St. James's, S.W., was elected a Fellow of the Society. Mr. W. F.

Kirby exhibited a series of a very dark-coloured form of *Apis* reared by Mr. John Hewett, of Sheffield, from bees imported from Tunis, which he proposed to call "Punic Bees." They were larger than the black *Apis unicolor*, Latr., of Mauritius and Bourbon, and were almost entirely black, except in the legs, which were of a more or less reddish colour. Mr. C. G. Barrett exhibited five melanic specimens of *Aplecta nebulosa*, reared by Mr. Collins, of Warrington, from larvæ collected in Delamere Forest, Cheshire, and described by him, in the 'Proceedings of the Lancashire and Cheshire Natural History Society,' as *A. nebulosa*, var. *robsoni*, in honour of Mr. John E. Robson, of Hartlepool. Mr. Barrett also exhibited a beautiful variety of *Argynnis aglaia*, taken in Norfolk by Dr. F. D. Wheeler, and two specimens (male and female) of *Lycæna argiades*, taken in August, 1885, on Bloxworth Heath, Dorsetshire, by Mr. C. O. Pickard-Cambridge and Mr. A. Pickard-Cambridge respectively. Mr. H. St. John Donisthorpe exhibited a collection of Coleoptera, comprising about thirty-six species, made in a London granary in 1890 and 1891. The genera represented included *Sphodrus*, *Pristonychus*, *Calathus*, *Quedius*, *Creophilus*, *Omalium*. *Trogosita*, *Silvanus*, *Lathridius*, *Dermestes*, *Anthrenus*, *Corynetes*, *Ptinus*, *Niptus*, *Anobium*, *Blaps*, *Tenebrio*, *Calandra*, *Bruchus*, &c. Mr. A. B. Farn exhibited a series of specimens of *Eubolia lineolata*, bred from eggs laid by a specimen taken at Yarmouth. The series included several remarkable and beautiful varieties, and the size of the specimens was much above the average. The Rev. Dr. Walker exhibited specimens of *Argynnis ino*, *A. pales*, and *A. frigga*, from Norway. Mr. B. A. Bower exhibited, for Mr. J. Gardner, specimens of *Nephopteryx splendidella*, H.-S., *Botys lupulinalis*, Clk., and *Bryotopha obscurella*, Hein., taken at Hartlepool last June and August. Mr. R. Adkin exhibited two very dark specimens of *Peronea cristana*, from the New Forest. Colonel C. Swinhoe exhibited, and remarked on, types of genera and species of moths belonging to the Tineina, all of which had been described by the late Francis Walker, and placed by him amongst the Lithosidæ. Mr. H. Goss exhibited specimens of *Callimorpha hera*, taken in August last by Major-Gen. Carden in S. Devon, and observed that the species appeared to be becoming commoner in this country, as Gen. Carden had caught seventeen specimens in five days. Mr. Goss said that the object of the exhibition was to ascertain the opinion of the meeting as to the manner in which this species had been introduced into this country. A long discussion on this subject and on the geographical distribution of the species ensued, in which Mr. G. T. Baker, Mr. Stevens, Mr. Barrett, Colonel Swinhoe, Mr. M'Lachlan, Mr. Verrall, Capt. Elwes, Mr. Fenn, Mr. Jacoby, and others took part. Mr. C. J. Gahan contributed a paper entitled, "On South American species of Diabrotica: an Appendix to Part II." Mr. M'Lachlan contributed a paper entitled, "Descriptions of new species of holopthalmous Ascalaphidæ." Mr. W. L. Distant communicated a paper entitled, "Descriptions of four new species of the genus *Fulgora*." Mr. F. Enock read a paper entitled, "Additional notes and observations on the life-history of *Atypus piceus*." Every detail in the life-history of this spider was most elaborately illustrated by a large number of photographs, made by Mr. Enock from his original drawings, and shown by means of the oxy-hydrogen lantern. A discussion followed, in which Mr. C. O. Waterhouse, Dr. Sharp, Mr. G. C. Champion, the Rev. A. E. Eaton, Mr. P. Crowley, and others took part.—H. Goss, *Hon. Sec.*

South London Entomological and Natural History Society.—*Nov.* 12, 1891. Mr. W. H. Tugwell, President, in the chair. Mr. Cooper exhibited a variety of *Abraxas grossulariata*, L., well banded, and without any trace of yellow in the markings of the wings. Mr. Auld, a hornet's nest from Ware, Hertford. Mr. West (Streatham), *Polia chi*, L., from the Lake District, one specimen being extremely dark. Mr. Herbert Williams, wine corks perforated by the larvæ of some insect; one of these larvæ was also exhibited: Mr. Williams stated that they were doing a considerable amount of damage to a city wine merchant's stock; the corks of over two hundred bottles of port (for which wine the species showed a decided preference) having been attacked. Mr. C. G. Barrett said he thought the larva was a half-grown specimen of *Œcophora pseudospretella*, Sta.; but it was very active, and might be the equally common *Endrosis fenestrella*, Scop. Mr. Adkin said he did not think either species confined their attention to port-wine corks, nor did he think the larvæ ever went through the cork into the wine. Mr. Forrester showed *Bombyx quercus*, L., var. *callunæ*, Palmer, from Perth. Some remarks were made with reference to this exhibit, in the course of which several instances were mentioned of full-fed larvæ of *B. quercus* having been taken in the autumn, at Folkestone and elsewhere. Mr. E. Joy, *Epinephele hyperanthes*, L., the variety *arete*, and others approaching it. Mr. C. G. Barrett, a variety of *Argynnis aglaia*, L., taken in Norfolk; two specimens of *Lycæna argiades*, taken on Bloxworth Heath in 1885; and specimens of *Aplecta nebulosa*, Hufn., reared by Mr. Collins, of Warrington, from Delamere Forest, and named by him var. *robsoni*. Mr. Tugwell exhibited some parasitic fungi, and remarked that it was one of the Entomophthoræ, a tribe of fungi parasitic on insects; he noticed this fungoid growth apparently growing from the soil in one of his breeding-cages in which eighty larvæ of *Eucosmia certata*, Hb., bred from ova, had pupated; the larvæ were fed on *Berberis vulgaris;* the fungi were half an inch or more high; on examination he found that all of the fungi sprung from the pupæ of *certata*, the whole of which were dead; some were enveloped in the fungus, but others were apparently healthy, but traces of white thread-like spots of the fungus were noticeable, and the pupæ were dead and could be snapped asunder like a damp rotten twig. Thinking that the germ of the fungus might have been introduced into the larvæ by the food-plant, Mr. Tugwell stated that he had placed some pupæ of *Gortyna flavago* in some of the same soil, and all those that were not on the point of emerging were killed by the fungus. Mr. Fenn said he had experienced the same thing in two or three cages. Messrs. Adkin, Carrington, West and others took part in the discussion which ensued. Mr. Adkin again exhibited the specimens of the *Tortrix* which Mr. Carpenter had named *donelana*, and remarked that he had been stated, in a report of a previous meeting, to have exhibited these specimens as *Tortrix steineriana* var. *dohriana ;* he had, however, when exhibiting them, said he considered them to be *Tortrix viburnana;* he had now a specimen of the variety *dohriana* from Dr. Staudinger's collection. Mr. Tutt had brought his series of this variety which he had received from Herr Hoffmann; and Mr. C. G. Barrett had brought specimens of *T. steineriana* and examples of *T. viburnana* and its varieties. Mr. Barrett said he had been in correspondence with Mr. Carpenter on this subject, and was still of opinion that the specimens were simply *T. viburnana*; Mr. Carpenter had written to him, that although the larvæ fed on pine, one example had fed equally well on *Vaccinium*. Mr. Tutt said that in this part of the genus there were some six or eight species very closely allied, and it was difficult to separate these after studying the variation among them, and he added that the figure published by Mr. Carpenter was undoubtedly *steineirana*; he did not for a moment suggest that Mr. Barrett was not right in calling the Irish specimens *viburnana*, but until more material was obtained he did not think it could be assumed they were distinct from the Continental *T. steineirana* var. *dohriana*. Mr. Barrett remarked that Mr. Carpenter's figure was from a single specimen, and was extremely unlike the majority of the specimens which had since been bred. Mr. Oldham exhibited, among other species, a black var. of *Cerastis spadicea*, Hb., from his garden, near Epping Forest, and a specimen of *Apamea ophiogramma*, Esp., taken in the Forest. Mr. South remarked that the first-named species should be called *ligula*, Esp., as it was not at all like Hübner's figure of *spadicea*.—H. W. BARKER, *Hon. Sec.*

LANCASHIRE AND CHESHIRE ENTOMOLOGICAL SOCIETY.—*November 9th*, 1891.—The President in the chair. The Secretary read letters from members of the South London Entomological Society, stating that Mr. Tutt's report of the proceedings of that Society (read at the last meeting) re *Tortrix donelana* was incorrect, and referred the members to their Secretary's report in the magazines for what actually took place. Mr. Robert Newstead, F.E.S., read a paper entitled, "General Notes on the Scale Insects, Coccidæ." The author gave a brief *resumé* of the work done by the earlier naturalists, and enumerated types of the principal genera (of which he had drawn large coloured diagrams in illustration). In the course of his remarks he described the distinctive characters, and exhibited drawings of the following new species :—*Lecanium assimilis*, on *Aster*, at Colwyn Bay; *L. minimum*, on *Areca* under glass, Cheshire; *Pulvinaria persicæ*, on peach, Cheshire; *Pseudococcus associalis*, on *Ribes*, Yorks; *Ripersia tomlinii*, on grass-roots in ants'-nests, Guernsey; *R. pulveraria*, under leaf-sheaths of *Agrostis*, Cheshire. Mr. Newstead exhibited specimens of 172 species of Coccidæ, including nearly all the known British species. Mr. Gardner exhibited *Coccus cacti* and *Carteria lacca*, the latter with their products. The Secretary, *Aspidiotus personatus*, *Vinsonia pulchella*, and *Lecanium oleæ*; the latter were much broken by some lepidopterous (?) larvæ, which had formed silken tunnels under the scales. The President exhibited melanic and other forms of *Liparis monacha*. Mr. Gregson, varieties of *Dianthæcia conspersa* and *Abraxas grossulariata*, bred by him this year. Mr. Walker, water-colour drawings of *Deilephila galii*; and Mr. Stott, a *Noctua*, previously exhibited some time ago, which had since been pronounced to be a variety of *Epunda lichenea* by Mr. Barrett. —F. N. PIERCE, *Hon. Sec.*

BIRMINGHAM ENTOMOLOGICAL SOCIETY.—*Oct.* 19*th*, 1891.—Mr. R. C. Bradley in the chair. Rev. C. F. Thornewill showed a number of insects taken on Cannock Chase this year, including a melanic variety of *Cymatophora duplaris*; also a collection made in Bucks this year, including *Cleora lichenaria*, *Boarmia roboraria*, *Adventia flexula*, *Phorodesma bajularia*, &c. Mr. G. W. Wynn showed a beautiful series of *Geometra papilionaria*, bred from Wyre Forest larvæ. Mr. P. W. Abbott showed *Setina irrorella*, *Agrotis lucernea*, and *A. lunigera*; long series from the Isle of Wight. Mr. R. C. Bradley showed *Acidia cognata* from Sutton, and *A. heraclei* from Moseley. Rev. C. F. Thornewill read notes on the recent discovery of

Stilbia anomala on Cannock Chase in abundance. Until last year it was not known to be a Midland insect, and then it was found by Messrs. Thornewill and Freer in such numbers on the Chase that the latter took 150 specimens, and this year it was equally common.

Nov. 2nd.—Mr. R. C. Bradley in the chair.—Mr. Bradley showed *Gonyglossum wiedemanni* from Sutton. Mr. H. J. Sands showed *Calligenia miniata* from the New Forest. Mr. W. Harrison, a specimen of *Epione apiciaria*, taken at Harborne so late as Oct. 3rd this year. Mr. G. W. Wynn, *Nudaria mundana* from Cleeve Prior. Mr. C. J. Wainwright, insects bought at the Rev. G. H. Raynor's sale, including fine variable series of *Hypsipetes elutata*, *Cidaria russata*, &c., and specimens of *Eupithecia irriguata*, *E. subciliata*, &c.—Colbran J. Wainwright, *Hon. Sec.*

REVIEWS.

A Series of Thirty Coloured Diagrams of Insects Injurious to Farm Crops. Drawn from Nature by Miss Georgiana E. Ormerod, in conjunction with Miss Eleanor A. Ormerod, Consulting Entomologist of the Royal Agricultural Society of England. London: W. & A. K. Johnson, 5, White Hart Street.

These diagrams, which are 30 in. by 22 in. in size, are published in sets of six, each set dealing with insect-pests belonging to various Orders. For example: Set 1, ' Common Insect Attacks," illustrates—1. Ox Warble Fly. 2. Horse Bot Fly. 3. Large White Butterfly. 4. Cockchafer. 5. Turnip Flea Beetle. 6. Onion Fly. The larva, pupa, imago, and sometimes the ovum, are shown both of the natural size and also greatly enlarged, and nicely printed in colours. A concise life-history of the insect depicted and practical directions for its prevention or destruction, by Miss Eleanor A. Ormerod, are printed at the foot of each sheet.

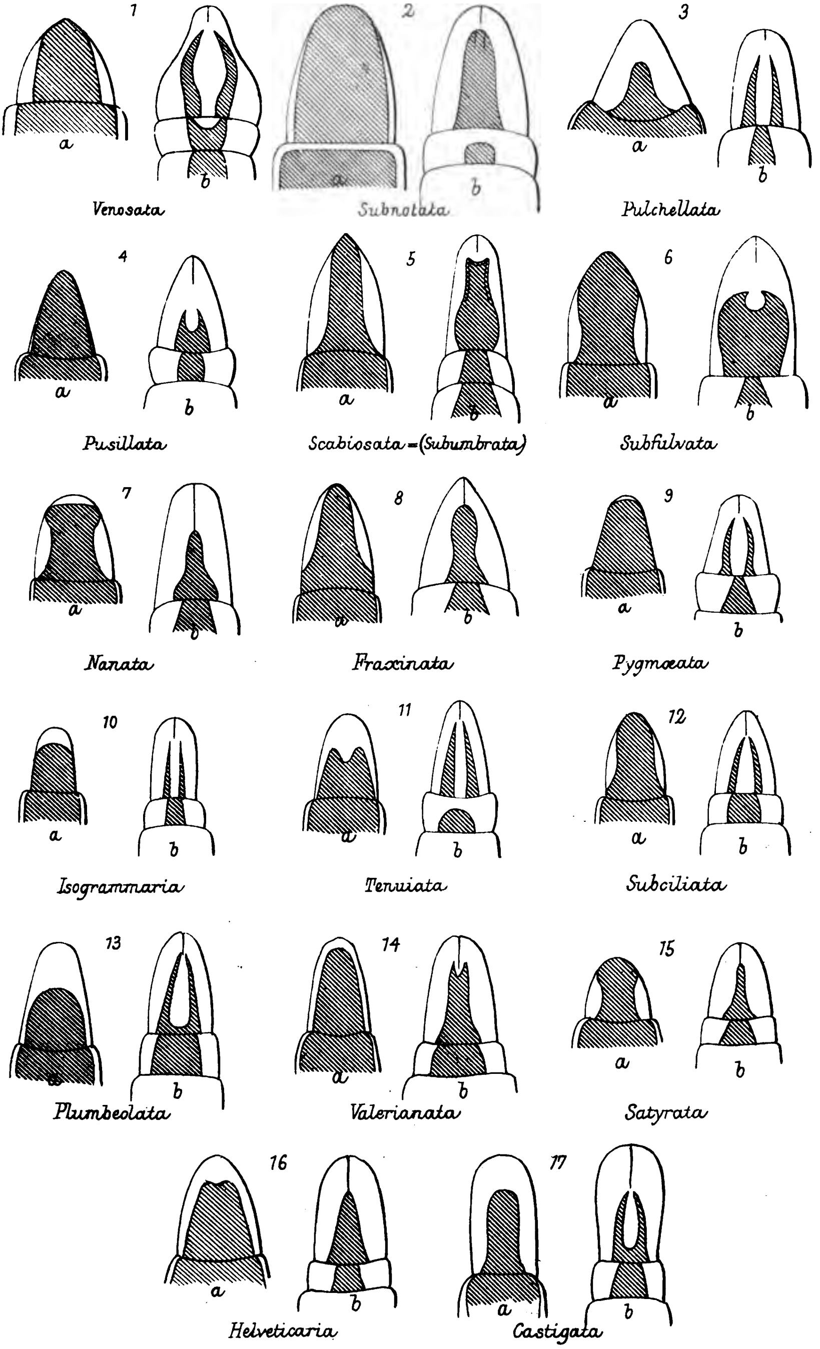
Not only will these diagrams be of considerable value to the agriculturist by enabling him to recognise his enemies, and instructing him how to destroy them, or to prevent attack, but, among other purposes for which they are suitable, they will be found useful in science class teaching.

Photography applied to the Microscope. By F. W. Mills. Small 8vo, pp. 62. London: Iliffe & Son. 1891.

To those wishing to become initiated into the mysteries of Photo-Micrography, we can recommend this cheap little practical guide. The opening chapter, which is written by Mr. T. Charters White, deals with the preparation of Microscopical Objects, and the necessity of perfectly flat mounting is insisted on. Chap. II. is devoted to a consideration of Microscopical Apparatus, and from this we learn that any one possessing a microscope with ordinary English objectives can add the necessary photographic requirements for general purposes at a cost of from £2 to £3. In Chap. III. advice is given on the Choice of Photo-Micrographic Apparatus, whilst in the remaining four chapters, the Dark Room and its Fittings, Exposure, Development, and Printing are dealt with, and full instructions given under each head. There is also a list of works on the subject.

WEST, NEWMAN & CO., PRINTERS, HATTON GARDEN, LONDON, E.C.

Entomologist. June. 1891. Plate 1.



Venosata

Subnotata

Pulchellata

Pusillata

Scabiosata = (Subumbrata)

Subfulvata

Nanata

Fraxinata

Pygmaeata

Isogrammaria

Tenuiata

Subciliata

Plumbeolata

Valerianata

Satyrata

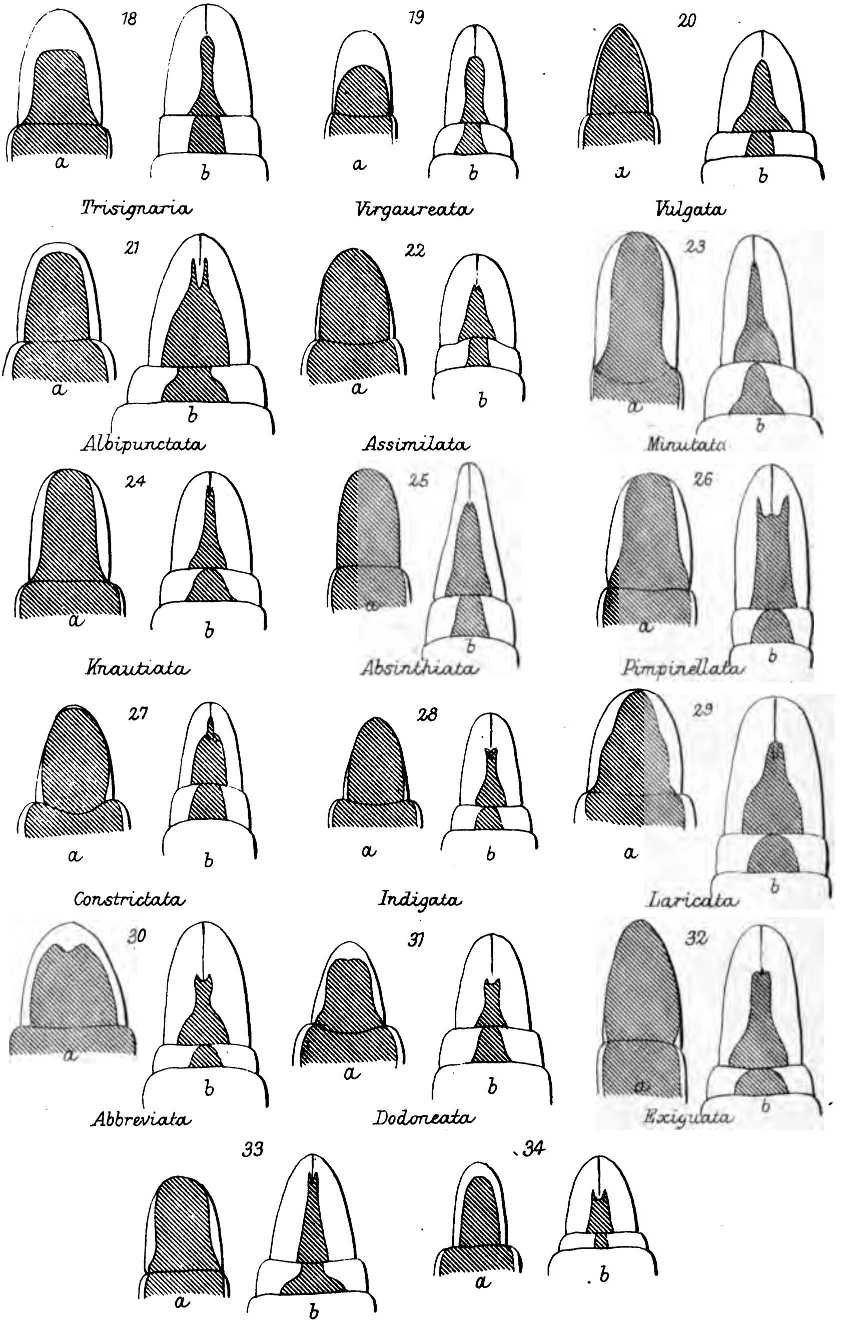
Helveticaria

Castigata

F Buchanan White ad nat del.
West, Newman lith.

Terminal Segments of the Genus Eupithecia.

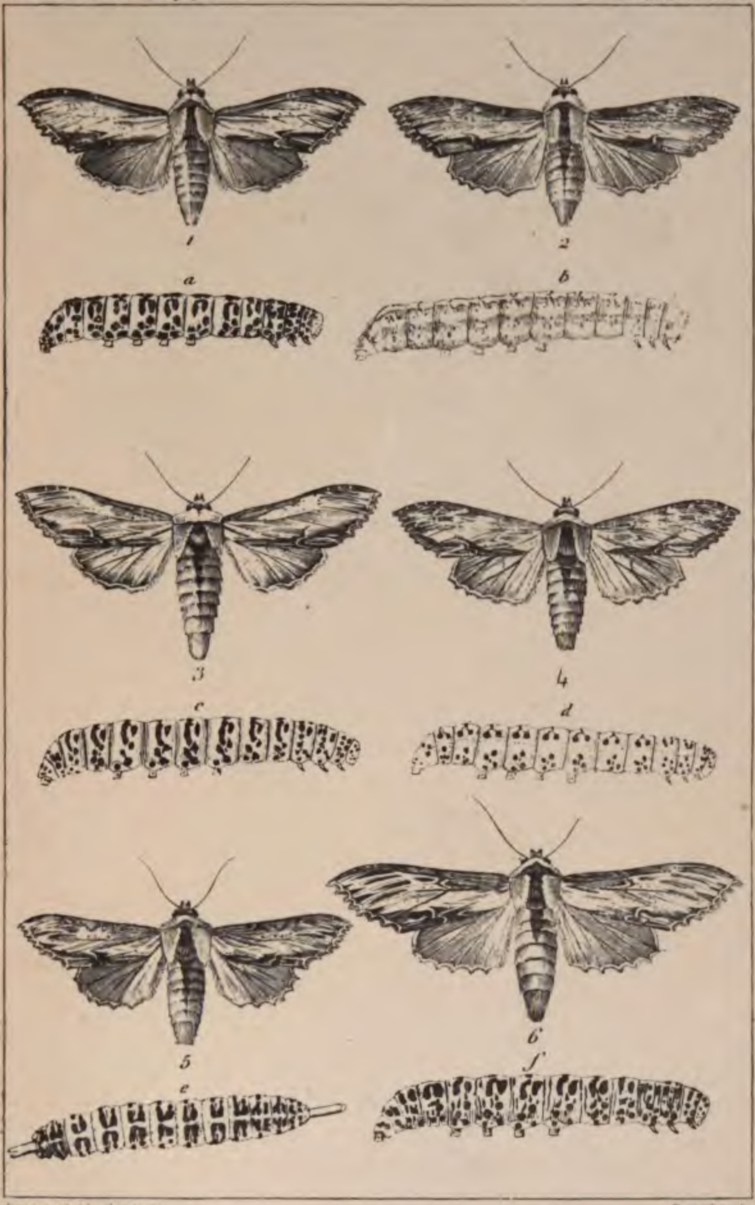
Entomologist. June 1891. Plate 2.



18 *Trisignaria*. 19 *Virgaureata*. 20 *Vulgata*. 21 *Albipunctata*. 22 *Assimilata*. 23 *Minutata*. 24 *Knautiata*. 25 *Absinthiata*. 26 *Pimpinellata*. 27 *Constrictata*. 28 *Indigata*. 29 *Laricata*. 30 *Abbreviata*. 31 *Dodoneata*. 32 *Exiguata*. 33 *Sobrinata*. 34 *Pumilata*.

F. Buchanan White ad nat. del. West, Newman lith.

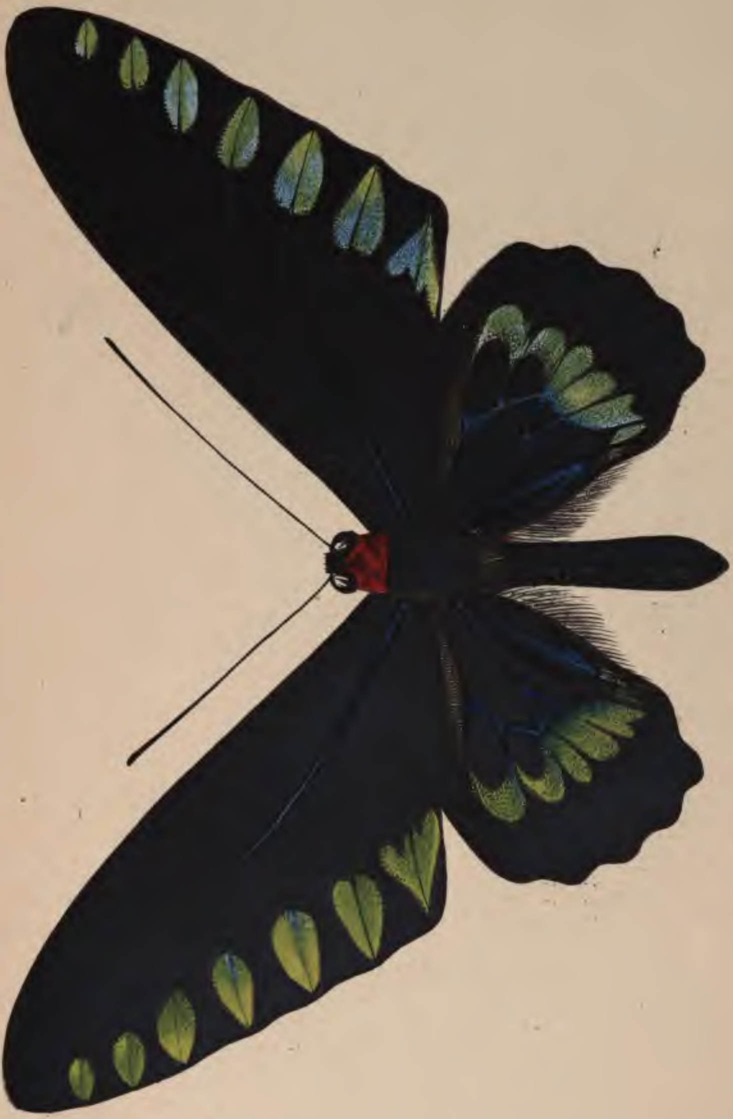
Terminal Segments of the Genus Eupithecia.



Lamour et Blanchard pinx Duprest sculp

N° 1 a **Cucullia** Scrophulariæ *et sa Chenille*. 2 b. C. Thapsiphaga id 3 c. C. Lychnitis id.
4 d. C. Scrophulariphaga id. 5 e. C Caninæ id 6 f. C. Verbasci id

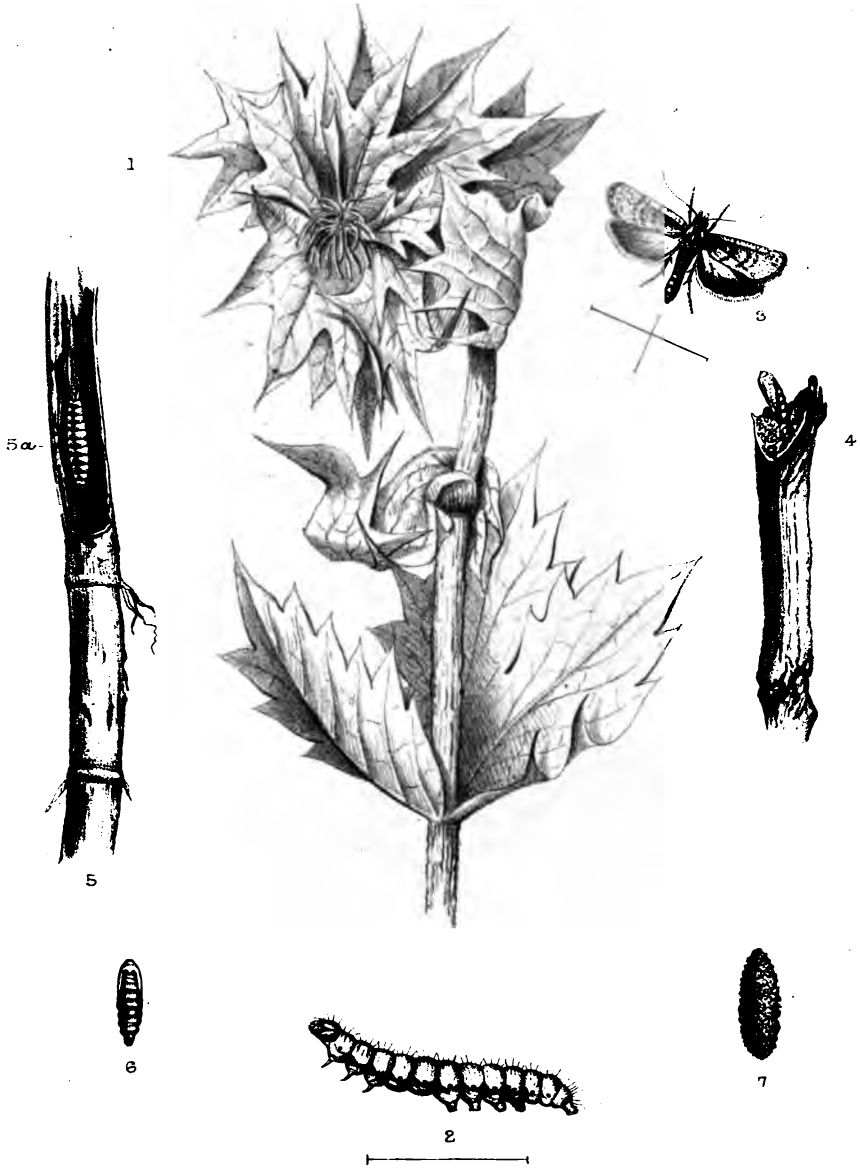
Entomologist Aug. 1891. Plate 4



Ornithoptera trojana. *Staudinger.*

West, Newman
Horace Knight } chr. lith.

Entomologist. Dec. 1891. Plate 5.



• West, Newman lith.

Argyrolepia maritimana, *Guen.*

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